FLYING
TECHNOLOGY DEPT
PUBLIC LIBRARY
APR 11 1945
DETROIT
MAY
1945
35c
In Canada 40c

Only six hours wide - with Cyclones

Flying with Cyclone power, the Boeing C-97 transport in its six-hour record flight from Seattle to Washington proved once again: aviation's military research benefits all aviation.

The Cyclone 18's used in this new plane came from an accelerated development program for the mighty Boeing B-29 Superfortress. The result was a superb engine for high speed flight of heavy payloads of any type—bombs, cargo or passengers. The record performances of the Lockheed Constellation and Martin Mars, likewise powered, bear this out. In fact, the Cyclone 18 is the only engine of over 2,000 horsepower used in four-engined service airplanes of any type. Its constant service development thus keeps it well in advance of new operational requirements.

WRIGHT AERONAUTICAL CORPORATION
Paterson, New Jersey, U. S. A.

In the Superfortresses, too

Cyclones Save 3 Ways

LESS WEIGHT—MORE PAYLOAD
LOWER FUEL CONSUMPTION
REDUCED MAINTENANCE

WRIGHT
Aircraft Engines

A Division of
CURTISS-WRIGHT CORPORATION

WRIGHT POWERS THE TONNAGE OF THE AIR

TECHNOLOGY DEPT.

The tire that sprouts wings

A PLANE can't land like a bird, reducing its speed to zero as it comes to earth. The multi-ton transports and bombers you see today come in at 65 to 140 miles an hour.

In most cases, landing wheels are standing still when all this tonnage first hits the ground. So there's a jolt and a screech because, for a measurable period of time, the wheels can't turn fast enough to match the plane's speed. Tires are dragged, scuffed, burned.

Any engineer could think of the answer—make the wheels spin as the plane comes in. People even had a word for it—"prerotation." Yet no one found a way to make prerotation practical until B. F. Goodrich designed the tire above.

This tire has wing-like vanes on the sidewalls that open when the wheels are lowered for landing. B. F. Goodrich made the vanes flexible so they open at the bottom of the revolution, close at the top. The airstream pushing on these vanes causes a rate of spinning up to 80 per cent of the plane's airspeed.

This "simple" B. F. Goodrich device will increase tire life. It can save tons of rubber. Most important, prerotation lessens the shock of landing on the undercarriage. If airplanes grow beyond the super-bomber size, the latter feature will make prerotation a must.

The prerotation tire is another addition to a long list of developments . . . another example of the more-than-ordinary ability at B. F. Goodrich. You can be sure that B. F. Goodrich tires for passenger cars are built with the same care and "know how" that go into this new plane tire. *The B. F. Goodrich Company, Akron, Ohio.*

Skyway or Highway

B.F.Goodrich

FIRST IN RUBBER

FLYING

MAY, 1945

VOLUME 36 • NUMBER 5

CIVIL AVIATION

I Am a Businessman Pilot ..... Harald H. Lindblad 28
What Is Weather? 30
The Case for the Hungry Pilots ..... George Reiss 51
NOTAMS—Aviation's News Service ..... Richard G. Aubry 52
Is the Stall Landing Obsolete? ..... John R. Hoyt 60

MILITARY

How the Red Air Force Fights ..... Curtis Fuller 21
Army Air Forces Report ..... Gen. Henry H. Arnold 24
Building the Superfort Team 33
Target: Formosa 35
Crash Landing 39
The Psychologist Picks a Pilot ..... Capt. Richard G. Hubler 54
Plane Paddlers ..... Edward Doherty 57
Jap Aircraft 62
Twenty Days on a Raft ..... Lieut. (jg) George H. Smith 63

ENGINEERING

FLYING Cutaway (The Lockheed Constellation) 67

AIR COMMERCE

'War-Baby' Airline 65

DEPARTMENTS

London Letter ..... Maj. Oliver Stewart 56
Report from Washington ..... Fred Hamlin 64
Have You Seen? 71
For Identification 74
I Learned About Flying from That!—No. 67 .. Maj. Charles M. Fischer 76
Letters 78
Library 80
AOPA News 82
The British Say 86
Fifteen Years Ago 96
Photo Credits 147

PHOTO SALON

Color Section 43

Cover Photograph: Vought Kingfisher, by W. Eugene Smith

WILLIAM B. ZIFF
Editor and Publisher

B. G. DAVIS
General Manager

MICHAEL H. FROELICH
Assistant to the Publisher

MAX KARANT
Managing Editor

CURTIS FULLER
Assistant Managing Editor

Associate Editors

CHICAGO
Paul Fountain, Lawrence Keil

WASHINGTON
Fred Hamlin, F. D. Walker

LOS ANGELES
Gaither Littrell

NEW YORK
William C. Hoff

Staff Photographer: Frank Ross

HERMAN R. BOLLIN
Art Director

GEORGE BERNER
Advertising Director

H. G. STRONG
Circulation Director

H. J. MORGANROTH
Production Director

Copyright, 1945
ZIFF-DAVIS PUBLISHING COMPANY

Editorial Offices, 540 N. Michigan Ave., Chicago 11, Ill.
Member of the Audit Bureau of Circulations

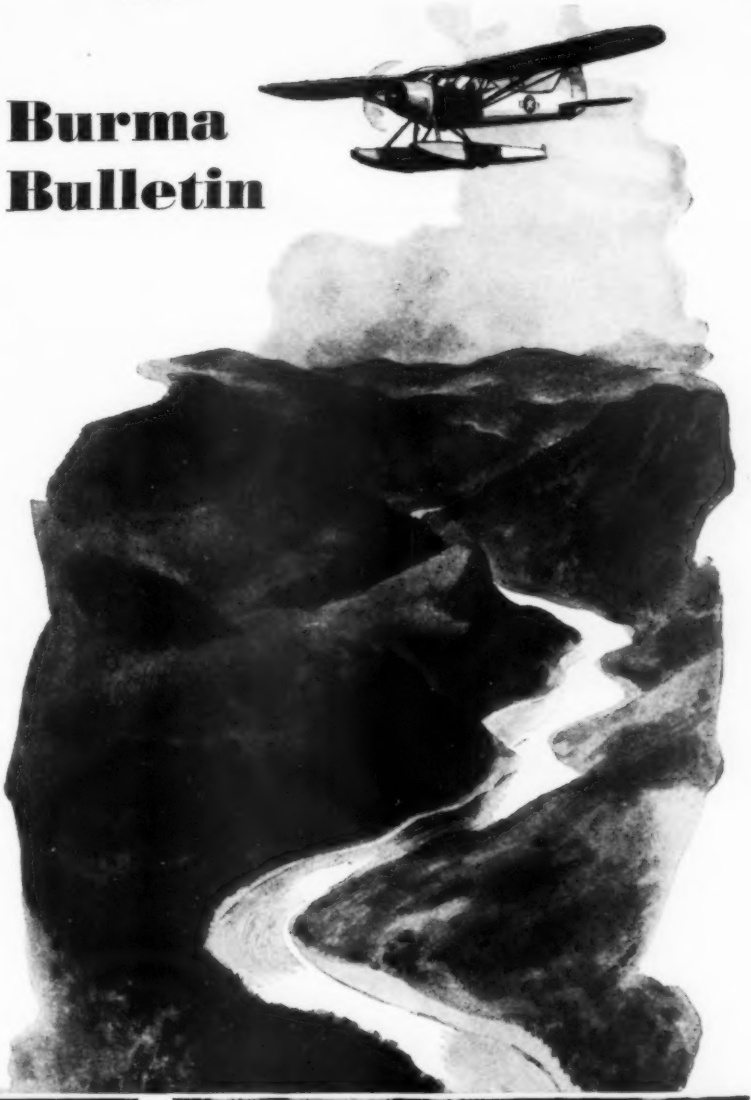
FLYING is published monthly by Ziff-Davis Publishing Company at 540 N. Michigan Ave., Chicago 11, Ill. New York Office, Empire State Building, New York 1, N. Y., Tom Crane, Eastern Advertising Manager. Los Angeles, Calif., William L. Pinney, Western Advertising Manager. Canadian Advertising Representative, G. J. McGoey, 21 King Street, East, Toronto. London Advertising Representative, J. Forecast, Newspaper Representations, Ltd., 231-232 Strand, London, W.C.2. London office, Grand Buildings, Trafalgar Square, London, W.C.2. Washington office, International Building, 1319 F Street, N.W. SUBSCRIPTION RATES: In U. S., 12 issues, $4.00, single copies 35 cents; in Mexico, South and Central America and U. S. Possessions, 12 issues, $4.00; in Canada, 12 issues $4.50, single copies 40 cents; in British Empire, 12 issues $5.00. All other foreign countries, 12 issues, $7.00. Subscribers should allow two weeks for change of address. Address all subscription letters to the Director of Circulation, FLYING, 540 N. Michigan Ave., Chicago 11. Entered as second class matter, September 8, 1942, at the Post Office, Chicago, Illinois, under the act of March 3, 1879. Entered as second class matter at the Post Office Department, Ottawa, Canada. Contributors should retain copy of contributions. All submitted material must contain return postage. Contributions will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Accepted material is subject to whatever adaptations and revisions are necessary to meet requirements. Payment covers all authors', contributors' and contestants' rights, title and interest in and to the material accepted and will be made at our current rates upon acceptance. All photos and drawings will be considered as part of the material purchased.

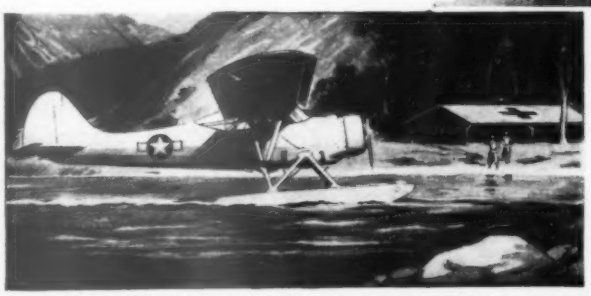
Burma Bulletin

IN Burma, too, the ubiquitous flying jeep has earned its service stripes . . . doing the jobs that only a jeep could do in a wilderness of steaming jungles, towering ridges and mountain gorges. Scouting and photographing ahead . . . bringing up ammunition—food—mail—freight . . . ferrying reinforcements . . . spotting for the gunners . . . speeding the evacuation of sick and wounded . . . performing miracle rescues . . . pacing the push at critical advance points where a "landing field" may be an hour-old strip—or a river sand bar.

Now a strange jeep makes its appearance in the Burma theatre. Strange only because it is a float plane flying overland . . . hundreds of miles from blue water. But this jeep seaplane is *amphibious*. Its Edo floats are fitted with retractable wheel gear! The same pin-point landing strips are accessible to the pilot of this jeep. But so also are countless additional "ports" on the rivers that wind tortuously through the Burma hell. And that gives the versatile amphib an important strategic advantage on many a mission when success hangs on a slim margin of miles or minutes.

Blazing new trails—landing and taking off from jungle clearing and muddy stream—the Edo-equipped amphibious jeep is helping to win new laurels for the hardy pilots who fly the never-ending trek that is Burma.





EVACUATING SICK AND WOUNDED WITH A STINSON L-1A EQUIPPED WITH EDO AMPHIBIOUS FLOATS

EDO Amphibious FLOAT GEAR

SERVES THE UNITED NATIONS

ARMY E NAVY

EDO AIRCRAFT CORPORATION

414 SECOND ST., COLLEGE POINT, L. I., N. Y.

Stinson
—tuning up for an important take-off

PIONEERING When the first Stinson plane took to the air, back in 1926, it was a plane ahead of its day.

The world had never before seen a plane that combined in its design an enclosed cabin, wheel brakes, electric starter, and a cabin heater.

Into this new plane "Eddie" Stinson had also built another important "first"—an inherent stability that has been a characteristic of every Stinson plane built in the intervening years.

Constant improvements in design and performance have enabled Stinson planes to show an enviable record of performance in the 19 years of Stinson history.

Stinson "Firsts"

FIRST to fly from Detroit to Tokyo.
FIRST to fly from New York to Bermuda.
FIRST to carry government air mail in China.
FIRST to carry government mail in Mexico . . . and in the Philippines.
FIRST to explore the Greenland route to Europe, the present-day route of the North Atlantic Air Ferry.
FIRST to provide air-mail pick-up service.

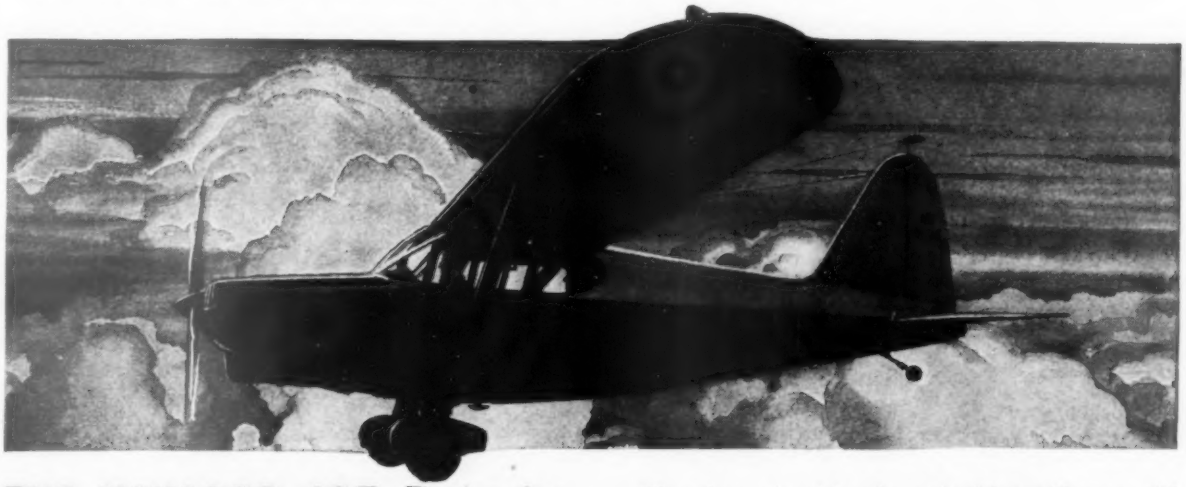
PROVED IN WAR On fighting fronts around the globe, liaison planes built by Stinson are again proving their utility and reliability—this time under the toughest flying conditions ever met by planes of this size and power.

Marines call for "air eyes" to help them push forward on a hard-won beachhead. So a Stinson "Flying Jeep"—the Sentinel L-5—scurries across the deck of a carrier to take the air and land in the midst of battle on a shell-pitted air-strip.

Medical corpsmen urgently need transportation for desperately wounded men lying in a field rimmed by mortar fire. And Stinson "Flying Jeeps" land alongside to take them swiftly and surely to the rear.

Here at home, another Stinson plane—the Voyager—has carried out 65 per cent of the operations of the Civil Air Patrol. CAA records show that the Stinson Voyager is the safest personal plane ever produced in quantity.

The Stinson Reliant AT-19 is widely used by the British as a navigational trainer. And almost every airline in the United States uses Stinson planes to train and check their pilots.



THE VOYAGER 125

The first plane designed by Stinson for future mass production is the Voyager 125.

The Voyager 125 is a product of Stinson engineering, designing, and production skill gained in our 19 years of experience in building quality personal planes—first for safe peacetime flying and then for tough battle flying.

The Stinson Voyager 125 is a family plane that carries the pilot and three passengers, with plenty of luggage space beneath the back seat. Powered by a 125-h.p. engine, it has a cruising range of 480 miles, a rate of climb of 700 feet per minute at sea level, and service ceiling of 14,000 feet. It has a maximum speed of 128 m.p.h. and cruises at 115 m.p.h. at 80 per cent power. It takes off, with flaps down, after a run of 545 feet, lands with a roll of 265 feet.

We welcome inquiries about the Stinson Voyager 125 and about our plans. The Voyager 125 will be coming off the assembly line 90 days after the time when the necessity no longer exists for allocation of all manufacturing facilities to production of airplanes for the Armed Services. Write to *Private Sales Director, Stinson Division, Consolidated Vultee Aircraft Corporation, Wayne, Michigan.*

Here's news for owners of Stinson planes

You can obtain parts for your Stinson plane through your local Stinson Distributor, or direct from the factory. Stinson service will help keep your plane in the air!

Stinson

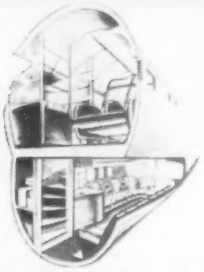
The Aircraft Standard of the World

DIVISION—CONSOLIDATED VULTEE AIRCRAFT CORPORATION
WAYNE, MICHIGAN

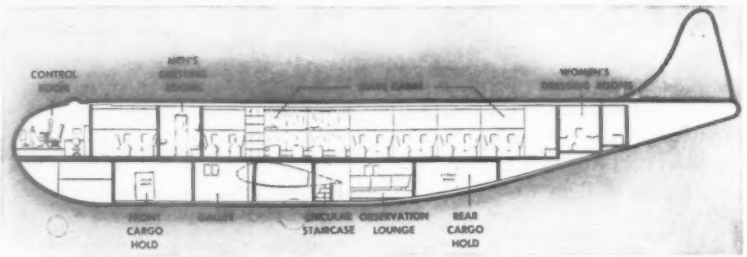
Stars in the sky... *The Stratocruiser*

A great airplane that flies first on CHEVRON AVIATION GASOLINE

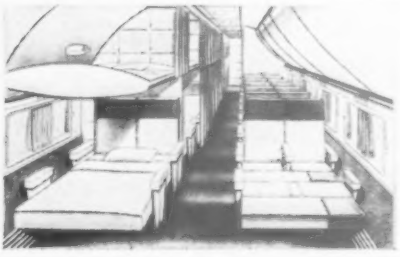
COAST TO COAST between lunch and dinner is the pattern set for postwar air travel by Boeing's new Stratocruiser. January 9 its military prototype, the C-97, sped from Seattle to Washington, D. C. in 6 hours, 3 minutes, 50 seconds, a new transcontinental record —flown on Standard aviation fuel and lubricants.



"SIAMESE TWIN" FUSELAGE permits luxurious lower deck dining-observation lounge. New high-octane fuels developed by Standard helped make possible big engines which give Stratocruiser high speed, huge capacity.

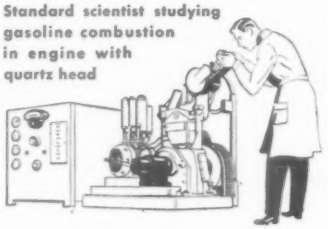


ROOM FOR 100 PASSENGERS and plenty of cargo in Stratocruiser. A direct outgrowth of B-29, it has top speed of 400 mph, range of 3500 miles. All present models built will go to military, and each one will leave assembly lines with tanks full of Chevron Aviation Gasoline. Boeing has used Standard aviation fuel exclusively since 1915.



FOR NIGHT FLIGHTS the Stratocruiser sleeps 36 and can carry additional passengers in lounge. The cabin is pressurized so that travelers in the big ship can cruise in comfort at high altitudes.

Standard scientist studying gasoline combustion in engine with quartz head



FOR PRIVATE FLIERS Standard Engineers have perfected new aviation fuels fitted to the special requirements of light-plane engines. They're designed to make your postwar plane, too, a star in the sky.

CHEVRON AVIATION GASOLINE

STANDARD OF CALIFORNIA

San Francisco, Calif.

Window in the Sky

A startling number of good flying days are lost to pilots who want to fly but find the contact method wearisome when visibility is restricted by "horizon haze."

With good instruments and the ability to follow them, such conditions are no deterrent to easy, safe and useful flight. And further, knowing how to use instruments is excellent protection in case the weather really does get thick en route.

The trend in the planes of the future is increased speed and longer range to expand cross-country travel. But this new utility cannot be realized without competent instruments and competence in using them. So if you're planning your future flying with instruments in mind, you're *right*. They will open up new avenues of the sky for your enjoyment and benefit.

Write today for our interesting and informative booklet, "Facts About Kollsman Aircraft Instruments"! Kollsman Instrument Division, Square D Company, 80-08 45th Avenue, Elmhurst, New York.

"Kollsman" is the standard of accuracy on the airlines of the nation!

This is the Kollsman Sensitive Altimeter with which most of the nation's airliners are equipped and upon which they depend for safe flying procedures. The Kollsman Instruments you'll buy for your own plane will be just as dependable.

KOLLSMAN AIRCRAFT INSTRUMENTS

PRODUCT OF

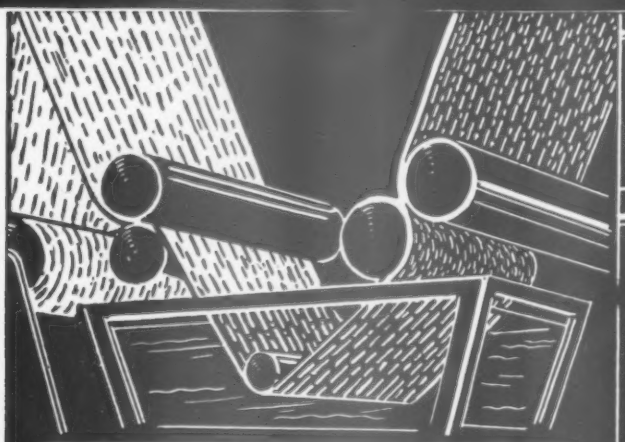
SQUARE D COMPANY

ELMHURST, NEW YORK GLENDALE, CALIFORNIA

Fire

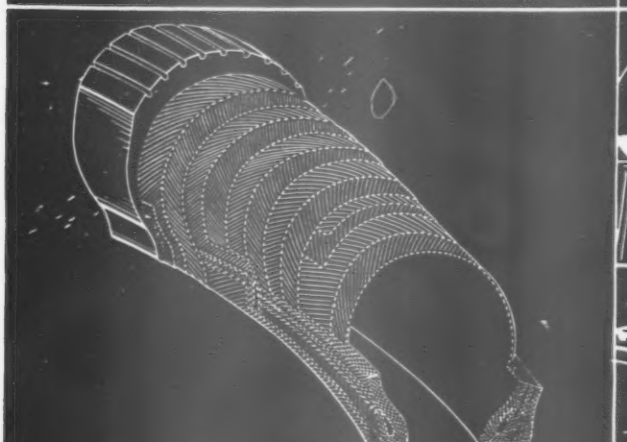
BEST TODAY.

ONLY Firestone TIRES GIVE YOU EXTRA VALUE FEATURES WHICH ASSUR



SAFTI-LOCK GUM-DIPPED CORD BODY. The long-staple cotton fibers of every cord are locked together for extra strength. These cords are then dipped in a special rubber solution for extra protection against blowouts.

VITAMIC RUBBER. The rubber used in both the tread and cord body contains Vitalin, a rubber vitamin developed by Firestone, which gives extra protection against weather-checking and wear and keeps rubber live and tough.

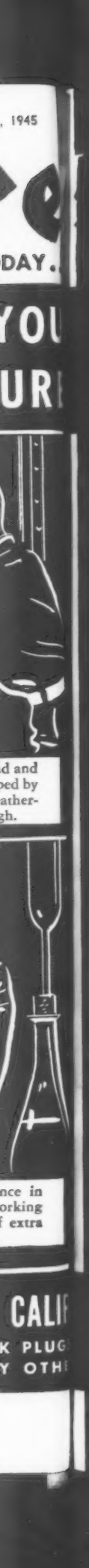


SAFTI-SURED CONSTRUCTION. There are two major parts of a tire — tread and cord body. Safti-Sured Construction means that the tread and cord body are welded together inseparably into a unit of extra strength.

"KNOW-HOW." More than 40 years of experience in building quality tires and more than 20 years of working with synthetic rubber are your best guarantee of extra quality and performance in Firestone Tires.

FIRESTONE AIRCRAFT COMPANY, AKRON, OHIO • LOS ANGELES, CALI

TIRES, TUBES, WHEELS, BRAKES, AIR SPRING LANDING GEARS, BATTERIES, SPARK PLUG
FABRICS, FOAMEX CUSHIONING, FUEL AND OIL CELLS, BUSHINGS AND MANY OTH


1945
DAY.
YOU
URI
d and
ped by
ather-
gh.
nce in
orking
f extra
CALI
K PLUG
Y OTH

ST

T

G

stone

STILL BETTER TOMORROW

THESE PATENTED AND EXCLUSIVE GREATER SAFETY AND LONGER LIFE

ALREADY, air lines are placing orders for postwar super-airliners that are still in the blueprint stage. And upon the operators will rest the responsibility for the safety of 100 or more passengers on every take-off and landing.

Such giant planes will need the safest tires that man can make and that money can buy. And that means Firestone Sky Champions, the only aircraft tires built with patented and exclusive construction features which provide extra safety and extra strength. From Firestone has come such revolutionary developments as the first synthetic rubber airplane tire, the first channel tread tire, the first low-profile safety nose-wheel tire and many products of Firestone research. And long before the planes now on order for tomorrow's airways are ready to fly, Firestone will be ready with tires that will make them safer, more dependable and more economical.

For it is a Firestone tradition always to make the Best Today . . . Still Better Tomorrow.

For the best in music, listen to the "Voice of Firestone" with Richard Crooks and Gladys Swarthout and the Firestone Symphony Orchestra conducted by Howard Barlow every Monday evening over NBC network.

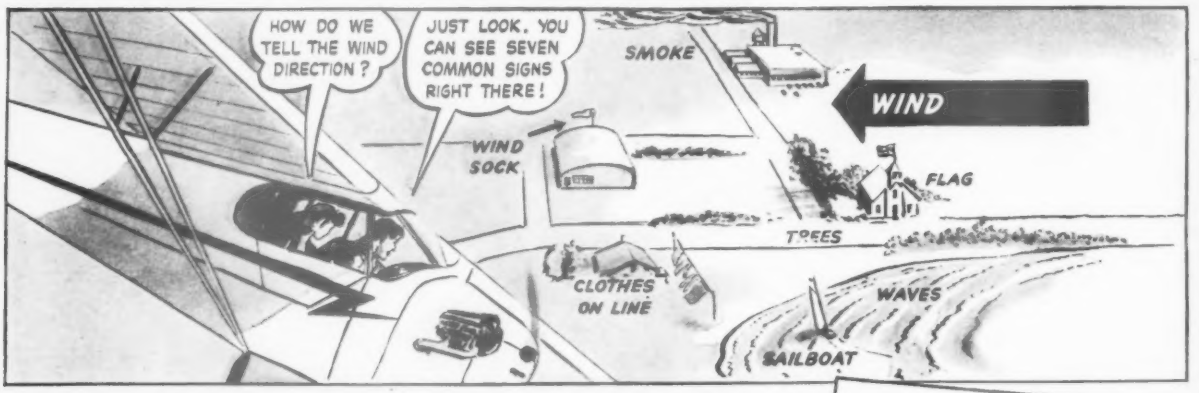
Copyright, 1945, The Firestone Tire & Rubber Co.

Firestone Sky Champion Low-Pressure Tires for landing wheels and tail wheels combine light weight with unusual strength. Specify Firestone Aircraft Tires on your postwar planes.

. . . . . MAKERS OF
VELON UPHOLSTERY
AIRCRAFT SUPPLIES

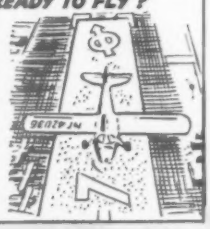
GET YOUR "HOW TO FLY" BOOKLET NOW!
IT SHOWS YOU HOW TO TAXI, TAKE OFF, CLIMB, TURN, GLIDE AND LAND IN A PIPER CUB!
How to Fly a PIPER CUB

Booklet contains over 50 step-by-step photos and descriptions, full-color pictures of Piper Cubs, color drawings of instrument panel and controls. For your copy, write Piper Aircraft Corporation, Dept. PA55, Lock Haven, Pennsylvania. Enclose 10c in stamps or coin for postage-handling.



IS YOUR TOWN READY TO FLY?

It should plan landing facilities now—for its citizens and its future. The booklet, "What Your Town Needs for the Coming Air Age," illustrates various types. It covers benefits, where to build and how to start. For your free copy, write Piper Aircraft Corporation, Dept. PA55W, Lock Haven, Pennsylvania.



NOTE: *This lesson and others that will follow explain only the fundamentals. See your Piper Cub dealer for actual flying instruction.*

★ ★ ★

FILMS AVAILABLE

Movie films that will be a great help in teaching the fundamentals of flying and plane construction are available to you. Interesting, clear, instructive sound narration. Write us for information describing films on "How to Fly" and "The Construction of a Light Airplane."

PIPER AIRCRAFT CORPORATION
LOCK HAVEN, PENNA.

PIPER CUB

Points the Way to Wings for ALL Americans

1945

Fitted to

ONE OF BRITAIN'S FOREMOST FIGHTERS

5-BLADE

'CONSTANT SPEED'

VARIABLE PITCH PROPELLER

ROTOL

LIMITED

ENGLAND

Designers and Manufacturers of

ALL-BRITISH 'CONSTANT SPEED' VARIABLE PITCH PROPELLERS

BUY
WAR BONDS

...in the BELLANCA Tradition for Dependability

OWNERS of the pre-war Bellanca Cruisair report that it ticks off the miles cross-country at a rate of better than 2 miles a minute, consuming only one gallon of fuel in 22 miles —shrinking distance and saving valuable time.

Such performance was to be expected of the direct descendant of those Bellanca planes which made aviation history as pioneers of the world's airways by their headline flights... the world's distance record flight of 5,011 miles non-stop from New York to Istanbul, Turkey... the world record breaking flight of 3,900 miles non-stop from New York to Berlin... the world's first and to date only non-stop flight from Tokyo to the United States... and the existing world's non-refueling endurance record of 84 hours, 33 minutes.

The ability of the Bellanca organization to produce such outstanding airplanes has been enhanced by its wartime experience — and the post-war Bellanca will possess all the fine characteristics associated with this name down through the years.

Your post-war family size Bellanca will be built to the highest standards of quality and safety. Comfort will be one of its outstanding features—and performance not yet approached in the light plane field. The Bellanca Cruisair was a pre-war favorite far ahead of its time—yet the new Bellanca, ready after Victory, will have all of its features, PLUS! You'll find the new Bellanca worth waiting for! .... Bellanca Aircraft Corporation, New Castle, Delaware.

The BELLANCA *Cruisair*

WITH A KINNER — YOU

CUT GROUNDED H

Whether you use a plane for revenue or fun, you pay through the nose for the hours spent in the service hangar. Since many groundings are the result of faulty engine operation, it's important that the powerplant be a Kinner — trouble-free, dependable, and easily serviced.

• • • Kinner engines are designed and built to give long hours of care-free operation. They turn out maximum horsepower many hours beyond checking and inspection periods. *They keep you in the air more hours.*

• • • Simplicity of design makes Kinners easy to service. Practical, fool-proof suspension permits easy removal when checks, replacements, or majors require shop work. Out of service hours are held to a minimum.

• • • Genuine Kinner parts have extra long life.

• • • Parts are always available. No Kinner has ever been orphaned. *You don't have to wait for parts.*

• • • Kinners are equipped with standard accessories, assuring quick and economical repairs or replacements. Kinner dependability, its simple and rugged construction, and easy serviceability, will go a long way to cut down your grounded hours. KINNER MOTORS, INC., Glendale 4, California, U.S.A.

BUY WAR BONDS

Kinner

you'll take your choice any week end

Are you a travel-tied, one-fish fisherman? Well, you won't be always. Any week end you'll be going after the "big stuff" now reserved only for two-week vacations. Mountain trout, muskies, tarpon mean Colorado, Wisconsin, Florida. Your postwar Cessna will put them all "just around the corner!" And you'll choose Cessna because your Cessna will be *Engineered for Safety* throughout.

when you CHOOSE CESSNA!

Fins for a whale of an airplane. They're the giant fins for the big Boeing Superfortresses . . . one of the *nineteen major parts now made by Cessna for the far-ranging, Axis-busting B-29's.* Cessna also makes the huge landing gears and engine cowlings for the Douglas A-26 Invader. And it's all-important to you, this high precision, all-metal wartime work at Cessna. Why? Because your postwar Family Car of the Air . . . an airplane of all-metal structure . . . will have the benefit of all the engineering, manufacturing facilities and know-how that produce these battle-worthy units.

Take interchangeability for instance. Cessna's high precision tooling means you'll get perfect-fitting parts from dealers' stock as you now get a spark plug for your car. Another reason why your postwar Cessna will be a better, safer, airplane . . . why you, too, will *choose Cessna.*

CESSNA AIRCRAFT COMPANY
Box 1616-F, Wichita, Kansas

Cessna

SYMBOL OF AIRCRAFTSMANSHIP FOR THIRTY-FOUR YEARS

ARMY-NAVY E

A set of Golf Clubs will show you . . .

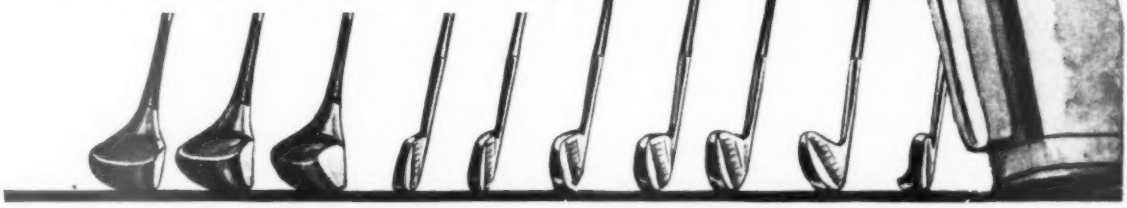
Why You'll Want This "Propeller with a Brain" On Your Private Plane of Tomorrow

Yes Sir! To perform at his best, any golfer needs a set of clubs . . . not just one. Because each club has a different pitch . . . meets the ball at a different angle . . . so the golfer can vary his clubs to meet varying conditions and shoot a whale of a lot better game.

Likewise, to perform at its best, any airplane needs a propeller that varies its pitch . . . varies the angle at which it meets the air . . . so it can deliver peak efficiency under varying conditions of flight. And that's why you'll want an Aeromatic! *It's the one and only propeller that varies its own pitch . . . automatically . . . without instruments or controls.*

In terms of performance for your postwar plane, Aeromatic means one-fourth shorter takeoff runs . . . one-third higher rate of climb . . . cruising faster and farther at the most favorable altitude . . . all with minimum fuel consumption and engine wear. And it means long glides for happy landings . . . with an instantaneous change of pitch for a quick pickup if you overshoot the field.

If you fly, or plan to fly, you'll want an Aeromatic Propeller on your plane. Write to your aircraft manufacturer about it today. And if you'd like our little get-acquainted folder, containing a diagram of the "brain" in an Aeromatic Propeller, don't hesitate to write to Aeromatic, 248 Scott St., Baltimore 3, Md. We'll be glad to hear from you.



The Propeller with a Brain for Tomorrow's Plane

Aero matic

Air Controlled Automatic Propeller

KOPPERS COMPANY, Inc., BARTLETT-HAYWARD DIVISION

Licensed under patents of EVEREL Propeller Corporation

HOW YOU CAN USE YOUR POST-WAR PLANE

So you're going to Fly!

Sure you're going to fly—you and thousands of other young-minded Americans. But please don't think that all of the wonderful things you've heard and read about personal flying will come true the day after V-day. They won't.

Tomorrow's personal planes will be better—lots better—than pre-war planes. They will keep costing less to buy and to operate. But such planes don't come from the Aladdin's lamp of wishful thinking. They come from long, hard, brilliant work by many people.

To you future flyers, we promise no miracles. But we do promise to apply our engineering and production skill to the continued development of Franklin engines—so that the Franklin engine of tomorrow will help make possible the plane you dream of owning and flying—at the price you would like to pay.

Franklin
FINE AIRCRAFT ENGINES

AIRCOOLED MOTORS CORP.
SYRACUSE 8, NEW YORK

A Stand for Flying's Future...

The price of not developing airports and ground service facilities is the indefinite delay of wide-spread flying.

To project the coast-to-coast aviation service network which *must* be built, much depends upon making it financially possible for fixed-base operators to establish the necessarily complete ground facilities wherever needed.

As has been proved, the fixed-base operator seldom can afford the financial burden and obsolescence factor presented by a stock of thousands of aircraft parts and supplies needed. Yet, he must have immediate access to such stocks if he is to render adequate service.

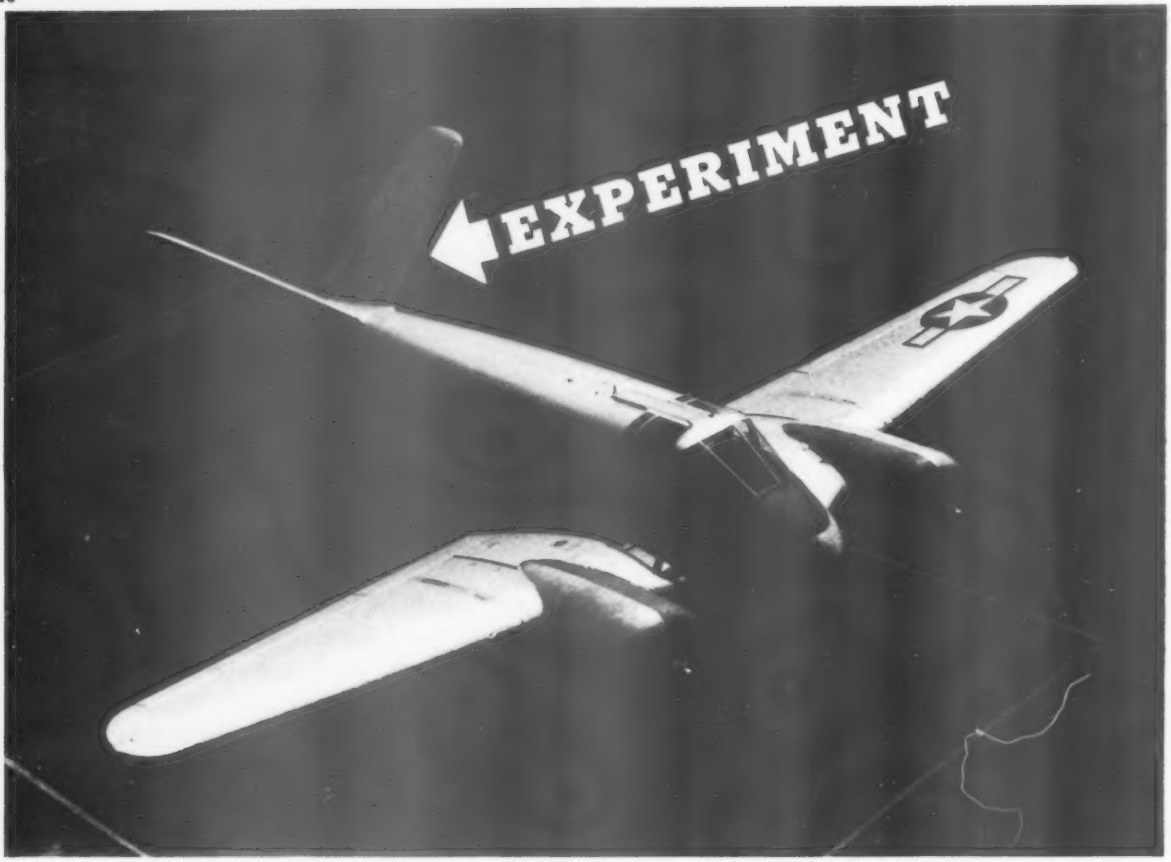
Aviation Distributors, however, are specifically equipped as a supply center. They are financed, stocked and strategically located to make all types of aircraft supplies quickly available to the fixed base operator . . . and specialize in this *alone.* By acting as a base of supplies, the Distributor assures every airport, large or small, equal opportunity to render complete ground service . . . releases the airport operators' finances for expansion of other ground facilities unhampered by too costly stocks.

Because private flying's future depends upon a sound business background for ground service expansion, The General Tire & Rubber Company restates its unswerving policy of *support* to the Aviation Distributor.

General pledges to protect the distributor's position by uniform discount practices . . . by assuring that no factory-direct-sales competition will undermine that position, by protecting trading areas and continuing to supply the same Top-Quality General Tire merchandise that has set the quality standards for the industry since its introduction.

AVIATION DIVISION
THE GENERAL TIRE & RUBBER COMPANY
AKRON, OHIO

KNOWN ROUND THE WORLD FOR QUALITY AND SAFETY



MANY research projects and experiments have been originated by Beech engineers since 1932. The results of their willingness to explore new fields are notable. The unique negative stagger Beechcraft biplane, long outstanding in its power class, is one. Another is the Model 18 all-metal twin-engine Beechcraft feeder airline and executive transport, an airplane which since 1936 has made such a record that thousands of these planes serve the armed forces as advanced trainers and personnel transports all over the world.

Since 1941, research at Beech Aircraft has had as its purpose the creation of improvements in aircraft designed for military use. Most of this research cannot be described, for obvious reasons. Something can be told, however, about the experiment pictured above — an AT-10 Beechcraft advanced trainer equipped with a unique two-element empennage which replaces the conventional tail group. Its successful flight tests have shown interesting possibilities.

Whether or not this particular experiment proves practically useful is unimportant. What does matter is the spirit behind such research — an aggressive exploratory spirit that is not confined by tradition and convention but is free to operate anywhere within the boundary of sound engineering principles. The Beechcrafts of the future undoubtedly will reflect the gains attained through such a program, and will offer to their owners, whether military or commercial, an extra degree of performance and value.

Beech Aircraft CORPORATION

BEECHCRAFTS ARE DOING THEIR PART WICHITA, KANSAS, U. S. A.

How the RED AIR FORCE FIGHTS

The Soviets emphasize tactics more than strategy and design both planes and plans for ground support.

By

CURTIS FULLER
Assistant Managing Editor of FLYING

Based on cabled reports from Col. Nikolai Denisov, Major Khapayev, Capt. G. Yurovsky, Capt. P. Zheltukhin, Maj. S. Ribakov and Maj. G. Zalutsky.

THE controversy over air power will not end when the war is over. Even if the arguments still current in newspapers and over the radio could be ignored, the success of totally different concepts of air power by the different Allied nations would keep the controversy alive. A comparison of the USAAF with the Red Air Force will emphasize these differences.

Stated in one way, the Americans, like the British, emphasize aviation as a strategic weapon—the Russians emphasize it as a tactical weapon. Stated another way, the western Allies, following Douhet's theories, believed that airpower would be the decisive weapon of the war—the Russians disagreed and looked upon it as merely another powerful weapon added to the army. Yet both the Russians and Americans use aviation both strategically and tactically.

The AAF believes that aviation can be decisive by destroying the enemy's means of making war—his industry, his communications. Our Army Air Forces have been mainly designed with this in view. Our strategists have selected the most vulnerable enemy industries and communications points as targets. The British have gone a step farther and blotted out entire industrial areas, coolly reckoning the Allied manpower required to make the explosives and build, maintain and man the planes as against the enemy manpower required to repair the damage they cause.

When the AAF uses aircraft tactically it follows a rigid pattern from which only extreme emergencies can cause it to deviate. This pattern, reduced to the formula of "priorities," is, first, to gain control of the air by knocking out airfields, destroying enemy aircraft, and hampering fuel supplies, second, "isolating the battlefield" by destroying the means of communications to front-line troops, and finally, third, lending direct support to our attacking ground troops.

How does the Red Air Force follow these priorities? But first, since we give strategic bombing first call over tactical bombing, how does the Red Air Force use strategic bombing?

It would hardly be necessary to list areas bombed or official statements to prove that the Russians do not look upon strategic bombing as decisive. One has

We have no fighters similar to these Yak-9's, built mainly of wood with plywood outer skins.

Captain Mayorov, fighter-pilot hero of the Soviet Union, in La-5, is typical of Red Air Force pilots who fly cover for Stormoviks and take a turn at ground support themselves.

only to examine the plane types used. The Red Air Force has only one four-engined bomber in combat use—the Tupolev-designed TB-7. The latest modification of this bomber of which we have knowledge has four twin-row radial engines of 1,600 h.p. each. The version with four 1,300-h.p. liquid-cooled engines is reported to have a maximum speed at optimum altitude of 300 m.p.h. and a range of 2,500 to 3,000 miles with a bomb load of two to four tons. Not much is heard about this bomber in combat and the first Russian planes to bomb Berlin were not TB-7's but twin-engined DB-3F's, now called I1-4's, since the Ilyushin company has taken over manufacture of the plane. The I1-4 weighs 33,000 pounds, carries a crew of four and has a top speed of about 300 m.p.h. at optimum altitude. It can carry a two-ton bomb load and is slightly larger than the American *Marauder* and *Mitchell*, which are comparable planes.

Another Russian twin-engined bomber is the Pe-2, designed by Petlyakov, which carries a crew of three or four and a maximum bomb load of 2,200 pounds. The Pe-2 cruises at 266 m.p.h. and has a normal loaded weight of 16,930 pounds. Though by American standards it would not be considered a strategic bomber, the Pe-2 has been used on strategic missions and, for that matter, so has the light attack plane which we know as the "Stormovik."

From the route of the Germans at Stalingrad up to December 1, 1944, the Red Air Force dropped 200,000 tons of bombs on strategic targets such as airfields, railroads and war industries. About half of the total strategic sorties since Stalingrad were flown in the first 11 months of 1944.

Just as an examination of the Soviet bombing planes led to the conclusion that the Soviets place little emphasis on strategic bombing, so an examination of their

Stormoviks, the two-place heavily-armored planes which give close ground support to the Red Army, are armed with two 32-mm. cannon, machine guns, and carry rails for rocket-propelled bombs. Lettering signifies first plane is a gift of the people of Chapaevsk.

The Petlyakov Pe-2 is a light bomber weighing no more than a Thunderbolt. It can carry a one-ton bomb load.

light bombers, attack planes and fighters leads to the conclusion that they place great emphasis on tactical operations, and especially on ground support.

The Russians have used several American fighter types but mainly *Airacobras* and *Kingcobras*, which have a 37-mm. cannon firing through the propeller hub. The *Airacobra* was not efficient at high altitudes but the Russians wanted it only for a low-level fighter and attack plane anyway. They are reportedly using the supercharged *Kingcobra* for the same sort of work despite its high altitude potentialities.

The most widely-used Russian tactical type is the Ilyushin-designed assault-bomber which is called the "Stormovik." The only version of which we have much information is the Il-2, which has a maximum speed of 280 m.p.h. It is armed with two 32-mm. cannon and two or four machine guns. One version also carries eight 56-pound rocket-propelled bombs. But more on the Stormovik later.

Another fighter-bomber type is the Lavochkin-designed La-5, with a top speed of 370-375 m.p.h. and one 1,600-h.p. two-row radial engine. It has an armament of two cannon and two machine guns. An La-7 is in action but the specifications are not known. The Russians also have a high-performance fighter in the Yak-9, designed by Alexander Yakovlev and built mainly of wood with a plastic-bonded plywood skin covering. Swedish sources report a top speed of 390 m.p.h. for the Yak-9, and a new engine is supposed to develop 1,800 h.p. It carries one cannon and two machine guns. The Russians also use British *Spitfires* and American *Mustangs* and *Thunderbolts*.

Let us compare the British-American tactical concepts with the Russian. The AAF's first tactical priority is to gain

(*Continued on page* 132)

The Il-4, formerly designated DB-3F, weighs 33,000 pounds, has range of 2,500 miles, maximum speed of 265 m.p.h., carries more than two tons of bombs, has 70 ft. 3 in. wing span.

ARMY AIR FORCES

By GEN. HENRY H. ARNOLD

The commander of the Army Air Forces tells the 1944 epic episode of "Bombs Around the World" in a report to the Secretary of War.

THIS is essentially a combat narrative which endeavors to explain the course of the war as affected by the course of the air war, to evaluate what has been achieved, and to outline the role played by the AAF in full co-operation with our Ground Forces, Service Forces, Navy and Marine Corps, and with our Allies.

The AAF does not for a moment forget that the AAF is one part of a well-balanced team. No accomplishment described here is exclusively that of the AAF; it is the result of the combined efforts and contributions of the Armed Services and civil populations of the United States and the Allied Nations.

This document contains military information that could not be released previously for reasons of military security.

Air War Against Germany

The week of February 20 to 26, 1944, may well be classed by future historians as marking a decisive battle of history. Early in 1942, recognizing the threat in the AAF's emphasis on the heavy-bomber and precision-bombing techniques, and in the RAF's conversion to heavy bombers, the German Air Force had concentrated on production of fighter planes for defensive purposes. The German plan was to quadruple the monthly output and keep their industry inviolate.

On Sunday, February 20, in the first good weather in weeks, we struck.

Nearly 1,000 AAF bombers escorted by fighters attacked fighter-plane factories at Brunswick, Oschersleben, Bernberg, and Leipzig in our heaviest assault of the war up to that time. A large part of the force was directed at the Messerschmitt Me-109 assembly factory and aircraft component plants at Leipzig. Defenses there had been alerted by an RAF area attack the night before and the Nazis rose in force.

Bombing results were good.

Production was stopped at the Leipzig and Bernberg factories, which together had been making 30 per cent of all single- and twin-engined fighters. Output at Brunswick fighter assembly plants had been interrupted by previous attacks and Sunday's bombardment put them out of business four more months.

The RAF bombed that night.

On Monday, Lieutenant General Doolittle's 8th Air Force heavies were over in force again. Tuesday they were joined by members of the 15th Air Force, based in Italy, in the first co-ordinated attack of the U. S. Strategic Air Forces in Europe. On Thursday the 8th and 15th struck another co-ordinated blow at German aircraft production. On Friday, for the fifth time in the week, we struck at aircraft factories. More than 2,000 planes from the 8th and 15th Air Forces set out for Regensburg, Augsburg, Furth, and Stuttgart. The operation set a new record for size; it climaxed five days of assault against one of Germany's most vital and well-protected industries; yet, significantly, official reports said: "Enemy fighter resistance was on a reduced scale."

Those five days changed the history of the air war.

From this time on, the *Luftwaffe*, converted to a defensive air force, was no longer an effective defensive air force. From that day the *Luftwaffe* rose to battle only when it believed it had local superiority or when high-priority targets were under attack.

Instead of fighter-plane production being quadrupled as planned, the German output for March, 1944, was less than in August, 1942, and the April figure was lower than March. By frantic dispersal of plants and desperate repairs the *Luftwaffe* maintained considerable capacity but it never recovered from those five days in February.

We paid a price for the air. We lost 244 heavy bombers and 33 fighter planes during five days. The Germans lost 692 aircraft in the air, many more on the ground. Beyond that, they lost to a great extent the capacity to replace their losses.

In April our strategic air forces in Europe—the 8th and 15th—destroyed 1,300 enemy aircraft in aerial battles. The fighters also developed special bombing techniques. Only a fighter can swoop low and drop a bomb within the entrance of a railroad tunnel to collapse a mountain upon a railroad line, or glide in diagonally to skip a bomb into the piers of a great bridge, or against the gates of a canal lock. *Lightning* fighter groups also developed a technique of precision high-

In the Pacific theater as in Europe, AAF planes bomb strategically. Here is a Liberator strike at Cebu in the Philippines.

REPORT . . .

altitude bombing, with their speed making enemy interception extremely difficult.

The *Luftwaffe* could not prevent us from attacking any portion of the Reich. We were ready to begin a major offensive against the oil refineries and synthetic plants which pumped the lifeblood of Germany's mechanized army.

On May 12, AAF heavy bombers escorted by fighters attacked synthetic oil-production facilities at Brux, Merseburg, Bohlan, Zeitz, and Lutzkendorf. On May 28, and again the following day, a combined total of 1,756 heavy bombers struck oil targets. Meanwhile, from Italy the 15th Air Force had begun attacking the major refineries of the Ploesti area.

There were many other things to do at the same time. They all led directly to D-Day—June 6, 1944.

The Invasion of France

In the initial phase of the Normandy operation, Ninth Troop Carrier Command dispatched 1,662 aircraft and 512 gliders; 17,262 troops were landed behind enemy lines, 110 jeeps, 504 artillery weapons, and over 2,000,000 pounds of combat equipment and supplies. Only 41 powered aircraft were lost.

With the beachhead secured, the ground-air team went into action. To use gridiron terminology, heretofore air power had carried the ball. Now the roles were reversed. The Ground Forces carried the ball and the Air Forces became the downfield blockers to help the ball carrier score. One aspect of this was taking out the enemy's bridges.

The AAF was ready for the big attack of July 25 at St. Lo.

As a prelude, fighter-bombers attacked all the bridges crossing the Vire River south of St. Lo, isolating the area. At 1040 hours *Thunderbolts* with bombs and incendiaries crossed east to west in seven waves, two or three minutes apart. Then for an hour more than 1,500 *Fortresses* and *Liberators* dropped 3,431 tons of explosives. *Lightnings* followed in eight waves lasting 20 minutes, laying more incendiaries. Then 400 medium bombers attacked the southern end of the area with 500-pound bombs, concentrating on crossroads and the German concentration of tanks and troops in the village of St. Giles.

As our ground troops went forward, fighters and fighter-bombers in closest communication and under common direction ranged ahead of them destroying military targets. Pilots carried maps strapped to their legs and were notified by radio when our advance changed the bomb line. This was called armed reconnaissance.

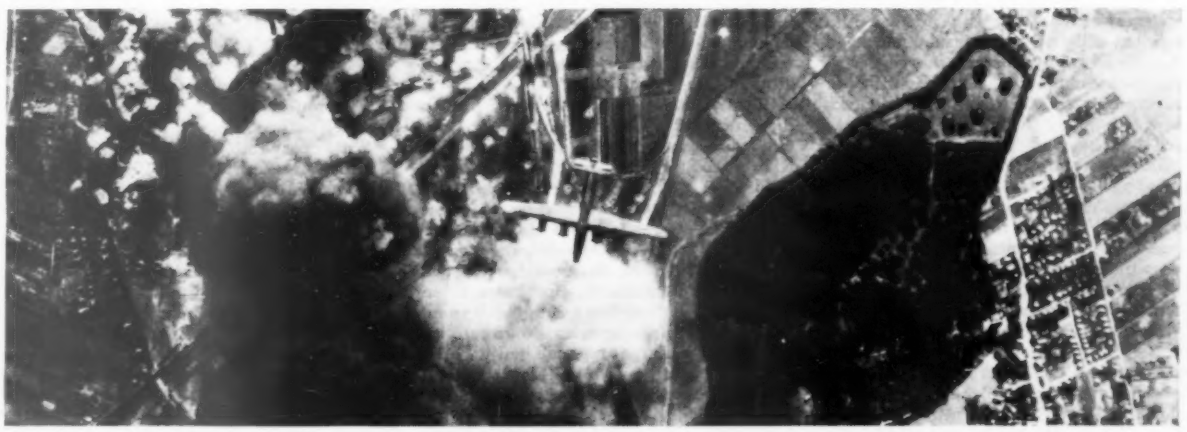
Fighters in direct radio communication with tanks flew constant alert over our armored columns. Ground officers called on the fighters to bomb or strafe artillery or armor in their path. Pilots warned tank commanders of traps at crossroads or woods. German armored units, without aerial eyes, fought at a disadvantage.

The German troops called our fighter-bomber the "Jagdebomber," or "Jabo." They lived in terror of it.

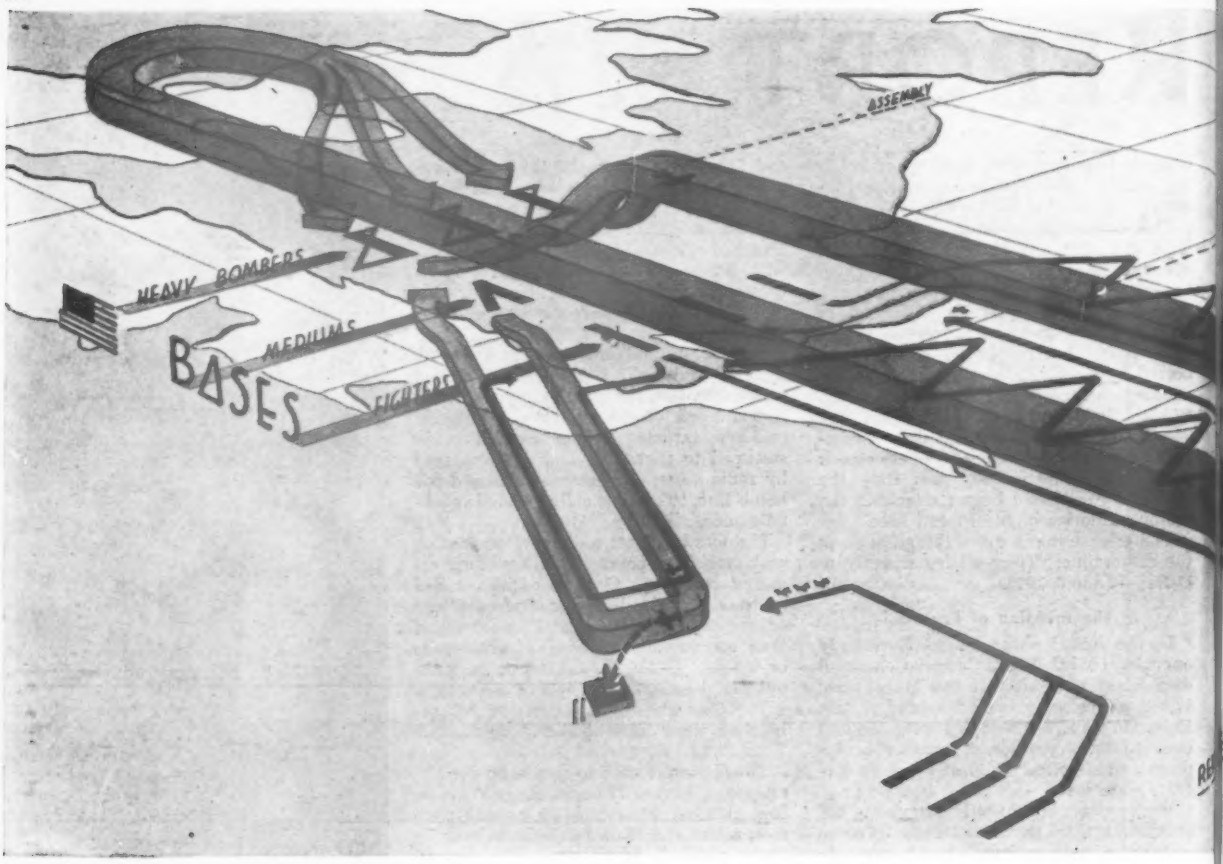
The Germans tried to escape on the afternoon of August 17 under cover of heavy low clouds. *Thunderbolts* caught German tanks and trucks in column moving three abreast, bumper to bumper, on three highways of Argentan. The planes bombed the leaders of the columns, blocking the roads, and then roamed over them strafing and bombing. German soldiers fled for hedges and ditches, horses stampeded, overturning their wagons. AAF fighters kept up the attack all day despite intense flak and foul weather. The smoke was so thick along some roads that pilots could not tally the destruction exactly, but they estimated 1,0000 vehicles destroyed. Next day in the RAF area, *Spitfires*, *Mustangs*, and *Typhoons* destroyed another thousand.

Large fighter forces were assigned to

From 10,000 feet, AAF bombs fall on Japanese barges being towed off Burma coast.



Liberators bomb Deurag-Nerag refinery at Hanover, Germany in a series of blows at Axis oil production from Ploesti to Borneo.



THIS IS WHAT HAPPENS ON A TYPICAL BOMBER MISSION

The heavy bomber force (large gray band) assembles over bases in England. It is met at a preselected rendezvous point by the first of a series of fighter escort forces (weaving lines) which accompanies bombers until it has to turn for home. Fighters have less range than bombers and their higher speed forces them to weave back and forth if they are not to outrun the bombers. For this reason, a single fighter escort cannot go all the way with the bombers. Enemy flak and fighter opposition (shown in red) is thickest over the target but may be encountered all along the route. After bombs away, the force turns for home. Returning fighters strafe ground targets. Meanwhile, medium bombers (small gray band at left) have drawn off some of the enemy fighters.

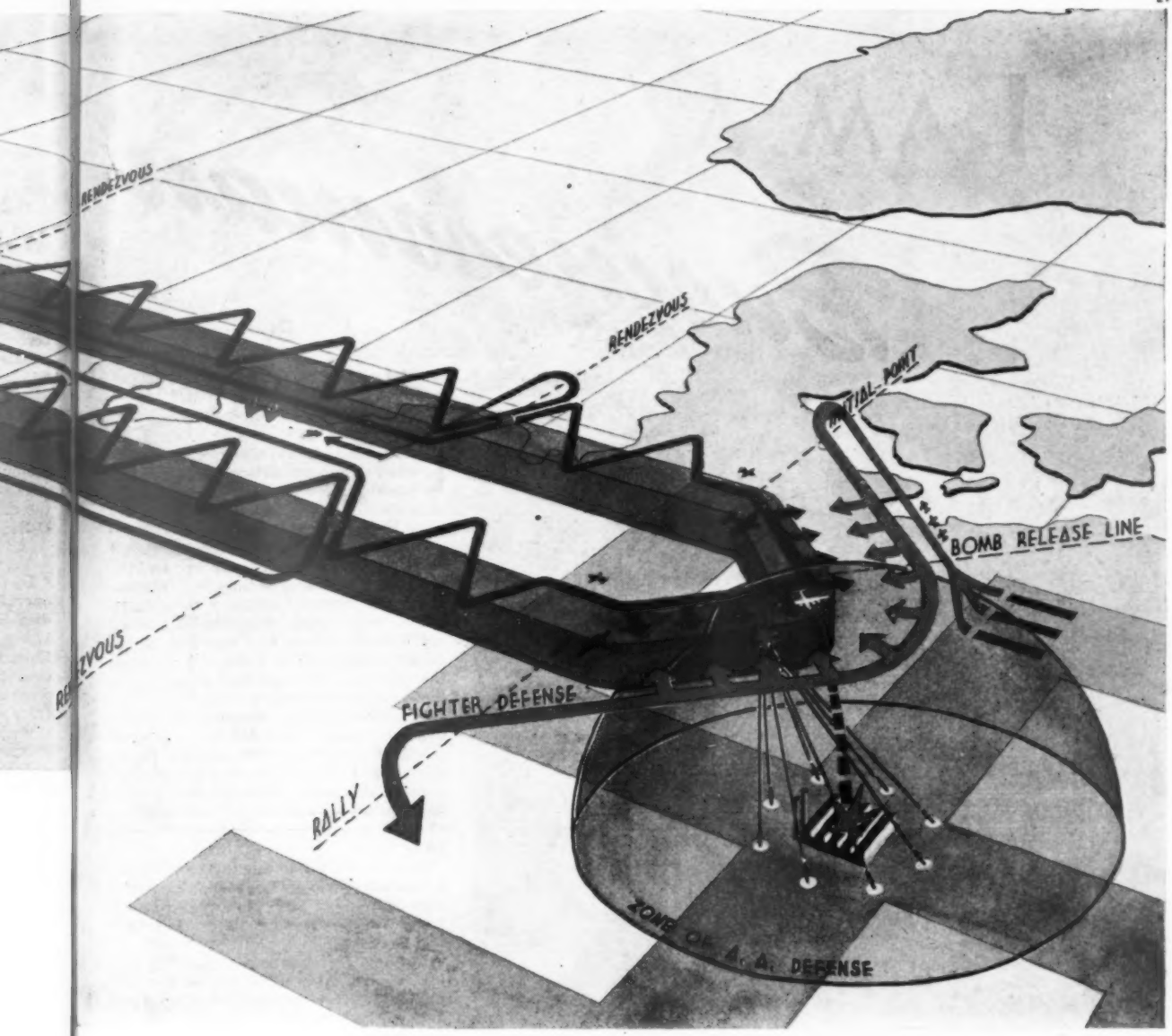
stop escape over the Seine. After the liberation of Paris, the Germans began to cross the Seine by pontoon, barge, ferry, and by swimming. The difficulties of crossing created pockets of motor trucks and troops along the river from Paris to Rouen. They were attacked. Thousands of German troops were cornered in the big loop of the river. Great numbers of vehicles were destroyed, thousands of troops with no way to escape were captured. German units which escaped across the Seine had so disintegrated that unit command was no longer possible.

During August, when the Third Army made its remarkable drive through France, Lieutenant General Patton purposely left an exposed flank as he swept along the north bank of the Loire. When this drive began General Patton told Brigadier General Weyland, commanding the 19th Tactical Command, "I am going to depend on you to protect my right flank with your airplanes." General Weyland did just that. Some 30,000 Germans south of the Loire who might have driven into the Third Army's rear were frustrated by our fighters and light bombers, prevented from attacking Patton, and hit hard every time they tried to organize for battle.

For three weeks the German commander below the Loire tried to move his divisions by night to attack but he could not, and it became obvious that to save his own organization he must retreat. In desperation he began moving by day and the incessant air attacks broke up his forces. Although at no time had he been engaged by any sizeable element of our ground forces, his position became hopeless and he surrendered, in fact, to an air force. In giving up his sword to a 9th Army Corps commander, who had come from Brest for the task, the German general asked, to maintain German honor, that General Weyland's aircraft which had conquered his units should fly over his men before they laid down their arms.

With every mile of our advance supply became more critical.

Skytrain transports and troop carriers took off from England, filled with five-gallon gasoline cans. Heavy bombers were pressed into transport service. Ordinary values in air transport were turned upside down. Gasoline was first priority. Ammunition came second. Food was third. After that came an amazing list of cargo, including whole blood, telegraph poles, belly tanks, helmet liners, fire trucks, shoe-stitching machines, rockets, watches, and mail to the men at the front.



On the return trip the planes brought back the wounded.

Ninth Troop Carrier Command alone evacuated 11,937 patients from the Normandy area before the St. Lo breakthrough, and Air Service Command of the U. S. Strategic Air Forces in Europe evacuated 26,347 men to the United Kingdom from June 11 to September 30, flying them from field stations close to the battle area to well-equipped hospitals. Evacuation was carried on close to the front, and a lighter plane, the *Norseman*, was flown to advanced temporary strips unusable by the *Skytrains*.

Aerial aid to the French Maquis was another important element in the battle of France. Eighth Air Force heavy bombers flew four major missions—and scores of smaller ones — to Maqui territory, their bomb bays filled with food and equipment and guns and ammunition.

One of the strangest stories of air activity has to do with a transport service between England and France which operated regularly during German occupation. Certain things could only be accomplished by direct contact. Some items could not be dropped by parachute. The job was entrusted to the 8th Composite Command. A *Skytrain* landed in a half-harvested wheatfield in France with the aid of Maquis on the ground. The plane was taxiied to a grove of trees and uprooted saplings were immediately planted all about it to conceal it from the air. Thereafter, this transport service operated for many months on regular schedule, round-trip from England with stop-over in France, until the area was liberated.

Assessment of Air Strategy

The liberation of the Paris area presented the first opportunity to study the results of strategic air assault at first-hand on an important industrial area.

The Renault automobile plant had been a target since the RAF bombed it on March 3, 1942. Before the war Renault had produced 200 passenger cars and 120 trucks a day, and employed 42,000 workmen. Upon occupation, the Germans converted it to war production of light tanks, marine and aircraft engines, trucks and automotive components.

The main Renault plant was bombed three times, once at night by the RAF and twice in daylight by the 8th Air Force.

Ground inspection showed that previous estimates of damage done, based on aerial photographs, had been accurate. Roof areas had been blown off, leaving Renault

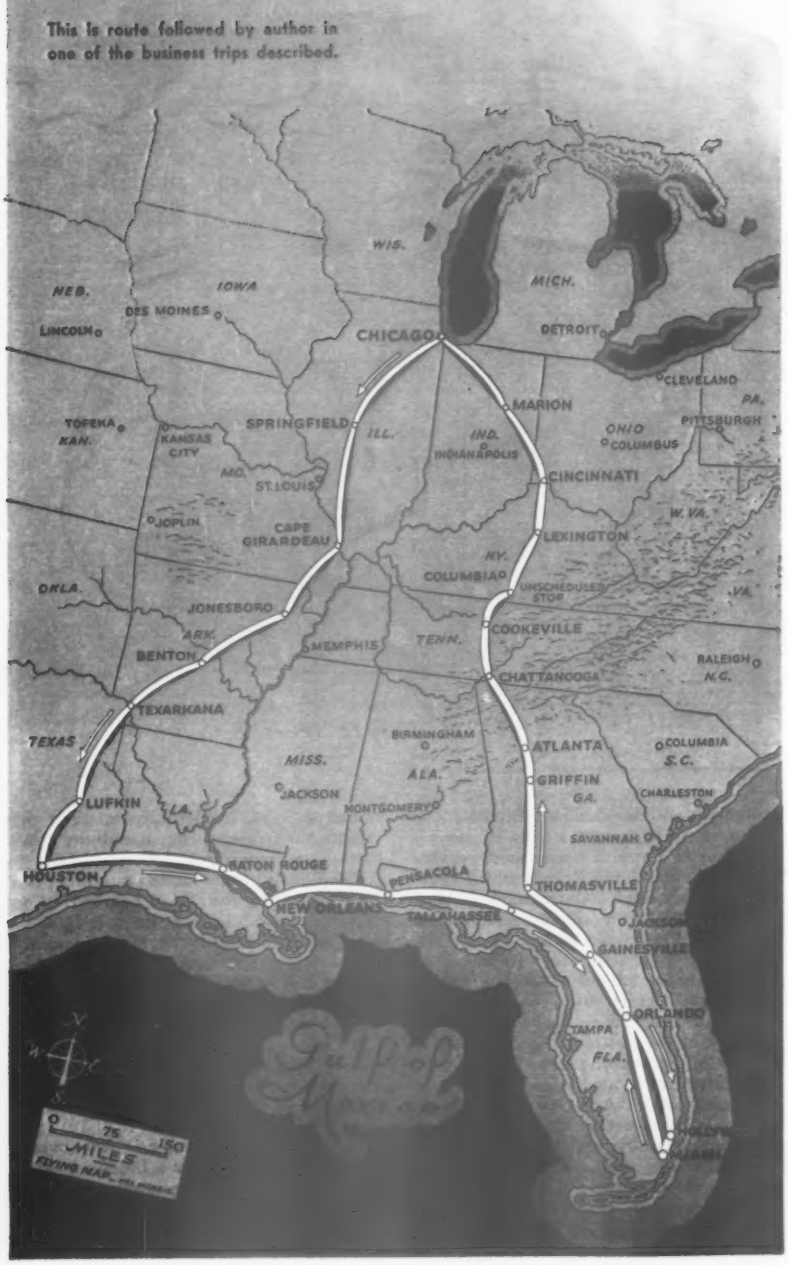
(*Continued on page 84*)

I AM A *Businessman*

By

Harald H. Lindblad

General Manager, Mid-States Equipment Co., Chicago



LAST June 1, in Cleveland, I was bumped off an airline by a priority passenger for the last time. In spite of wartime restrictions I made up my mind to learn how to fly.

Home in Chicago the following day, I went to Ravenswood airport on the northwest side and within five minutes I had my first introduction to a light-plane. With some misgivings I hoisted my 200-plus pounds into the small seat—an admirable feat in itself. Thus began the effort of one businessman to utilize flying in his business.

To determine the success or failure of my experiment I decided to keep close track of my costs. On August 14—65 days after I started—I found myself with a private license. This completed Step No. 1 in my experiment. I had acquired 67 hr. 5 min. of flying time, at a cost of $467.

Four days after getting my new license, I planned a trip to Winona, Minn., with a business associate. This was to be the first leg of my second goal—cross-country flights.

Leaving Ravenswood airport at 2:30 p.m. we had an overcast sky with a ceiling of 2,500 feet. Stopping at Lone Rock, Wis., I had my first contact with an emergency field and discovered that, while the boys there were helpful, the facilities were very limited. We were cautioned about a storm moving across our path, and indications were that it would reach LaCrosse, Wis., about the same time we would. We proceeded and before long saw the high, towering black cumulonimbus clouds streaked with lightning, warning of a cold front. However, we flew contact the entire distance and, aside from some gusts and blowing rain which were short-lived, we reached our destination safely and comfortably.

I have the greatest admiration for the cartographers who prepare the sectional maps. With one of these remarkable charts it is a mystery to me how anyone can become lost. I drew a true course line from my point of departure to destination, and marked one-inch intervals along that line. As is the custom, each mark represented eight miles, permitting a ground speed check by timing our passage between check points.

That flight took 3 hr. 15 min. Our

Pilot

Author (right) and his associate, H. D. Engelsman, plot their course for a business flight.

Is private flying adaptable to the needs of today's businessman? This busy executive believed it was—and proved it.

Stinson *Voyager* had been rented for $7 an hour, making a total cost of $22.75 for the trip. Our field engineer, who made the trip by automobile, left Chicago at 9 a.m. and, after driving through rainstorms, arrived at 11:30 that night. By then my associate and I were comfortable in our hotel, having been provided free transportation from the airport into the city. It was a courtesy we were to find at almost every airport we visited.

Two days later we left Winona for St. Louis, Mo. The air was cool and smooth at 5,000 feet and we cruised southward leisurely, following the Mississippi River. We stopped for fuel at Davenport, Ia., where I made my first down-wind landing; someone had neglected to change the wind tee. From Davenport we proceeded to Macomb, Ill., where we landed for lunch. Again a courtesy car was provided for transportation to and from the city. We were told that this field, hangaring 25 lightplanes, had not had an accident resulting in injury in 12 years.

Our next stop was the Curtiss-Parks field at East St. Louis, Ill. There was the ever-present courtesy car, prompt service and the economical fee of $1 for hangar charges and wiping off the plane.

Our flying time from Winona to East St. Louis was 5 hr. 5 min., representing an "air fare" of $35.60 for the two of us. Our associates in St. Louis were amazed to see us, since we were not scheduled to arrive until the next day. The possibilities of private plane travel now began to be clearer to me. I had more time for business contacts than ever before and additional calls were made possible because of decreased travel time. With two days remaining before we were due back in Chicago, we flew to Louisville, Ky., made calls there and left the following afternoon for Chicago. A service stop in Indianapolis for gas and oil took only 13 minutes. At 5:42 p.m. we touched the wheels down on our home airport.

This trip proved to me that my faith in private flying had been justified. Our total flying time was 16 hr. 35 min., which cost $118.45 or $59.22 per person—including all charges resulting from hangar rental, stakedown, and so forth. And it was accomplished by a pilot with a four-day-old private license!

Later in August I took my two small children along on a trip to Akron, O., also in a Stinson *Voyager*. Weather inquiries indicated that contact flight could be maintained throughout the entire route, but that rain would be encountered intermittently. I felt like an airline pilot that trip. En route I received word that both Akron and Cleveland were closed in by low-hanging ground fog and smoke.

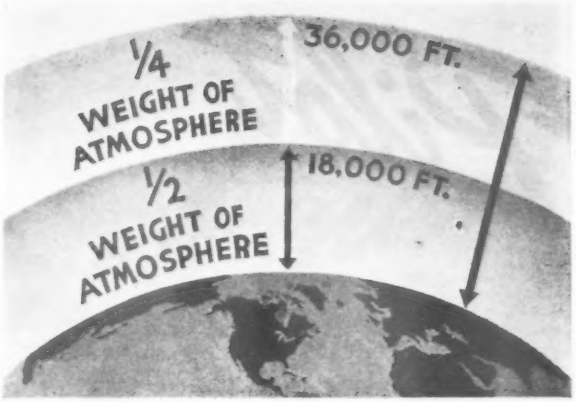
Using a prerogative not available to airliners, I headed for nearby Sky Haven airport, which is 1,000 feet above sea level and was not affected by the "smog" prevailing in the valley. Our flying time was 3 hr. 35 min., including a brief stop in Auburn, Ind., for lunch. Returning the next day we had a 40-m.p.h. cross-wind but we still arrived within a few minutes of our ETA. Although our elapsed time was greater than that of the airline transports, I believe that, within a 700-mile radius, lightplane travel will outstrip any other mode of transportation.

(*Continued on page* 128)

An emergency stop near Garland, Ky., gave this family group its first close-up of an airplane. None of them had ever "visited the city," although it was but 50 miles away.

WHAT IS WEATHER?

World weather follows a general pattern based on easily-understood physical laws.



As altitude increases, the atmosphere gradually thins. Most factors which make weather occur in the space lying below 18,000 feet.

IN ORDER to fly weather intelligently, it is necessary to have some knowledge of what weather is—what causes it, and what influences it. There is a definite pattern to the weather all over the world. "Bomber's moons" and thunderstorms aren't things that just "happen." They result from certain occurrences in the atmosphere that create particular effects. They are predictable and should be no surprise to the pilot with foresight.

Aerology—the science of meteorology as applied to the upper air—is essential knowledge you can gain from one of the world's oldest sciences. Writings on meteorology date back to Aristotle's observations in 400 B.C. Rapid advance has led to present day research carried on in our universities, although aerology is no easy field for the laboratory scientist.

Take, for example, a local summer shower. The air and water in such a shower weigh thousands of tons, and the energy involved approximates that which could be produced by burning several thousand tons of our best anthracite coal. Also, if you consider that a general storm may cover an area of *500,000 square miles*, you realize the impossibility of duplicating it in a laboratory.

The earth is surrounded by an envelope of gas which is called the atmosphere. The vertical thickness of atmosphere is so small in comparison to the size of the earth that, in proportion, it would be as thin as a sheet of tissue paper tightly wrapped around an orange. Atmosphere is composed of about 99 per cent oxygen and nitrogen, the remaining one per cent being distributed among several other gases, including water vapor.

As altitude increases, the atmosphere gradually thins and becomes rarified. Half the total weight of the atmosphere lies within the first 18,000 feet above the earth's surface; one-fourth lies within the next 18,000 feet; therefore three-fourths of the total atmospheric weight is below 36,000 feet, the remaining fourth being distributed from 36,000 feet upward to several hundred miles from the earth's surface.

The atmosphere is divided, generally speaking, into two main segments; the lower portion, next to the earth's surface, called the troposphere, and the upper portion called the stratosphere. The latter is practically cloudless and is rich in ozone. Between the two is a narrow transition zone called the tropopause.

All factors which make up the weather as we know it, clouds, rain, snow and ice, occur in the troposphere. This zone of weather varies in thickness from about 60,000 feet in the tropics to about 25,000 feet over the polar regions. It goes to about 36,000 feet over the middle latitudes. The depth of the troposphere varies slightly with the seasons, expanding during the summer and contracting in the winter. This is due largely to the heating of the earth's surface and atmosphere by the sun. All the energy received on the surface of the earth is radiated from the sun. The earth's surface absorbs this energy, but because the earth is composed of land and water, an equal amount of heat is absorbed over various regions. Land surfaces, which absorb energy rapidly, heat up to a higher degree and more quickly than water surfaces.

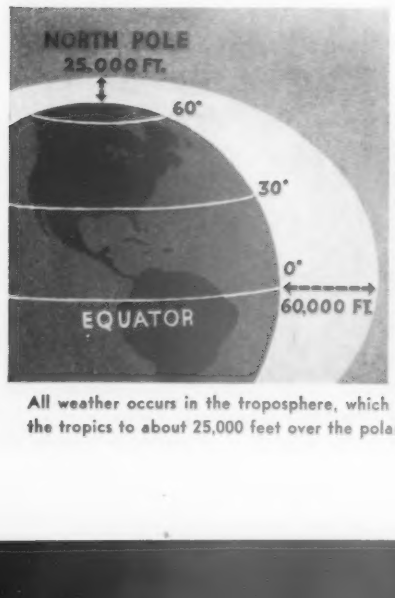
Over the equatorial belt much more radiant energy is received than over polar regions. With warm air over the tropics and cold air over the polar regions, the air over the equator tends to rise and cold air over the poles tends to sink. Peculiarly enough, the temperature pattern in the stratosphere is the reverse of that of the troposphere—colder over the tropics than over the poles. Over the Arctic, stratosphere temperature is approximately —49°, over the middle latitudes about —67°, while over the tropics it drops to —112°.

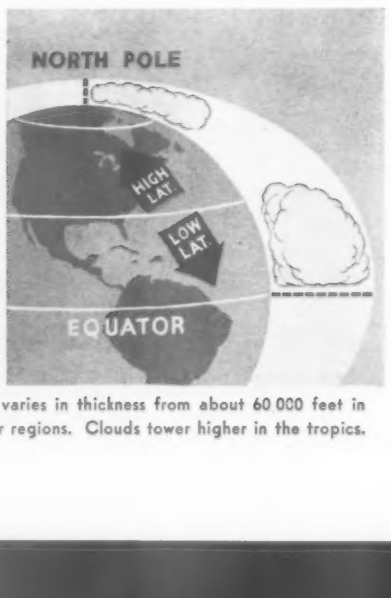
In the troposphere there is a general flow of air over the earth's surface which follows a definite and fixed pattern. The *rising* air over the equator results in *low* barometric pressure. The *sinking* air over the polar regions result in *high* barometric pressure. Air flows from high toward low pressures, and therefore there is a tendency for air to flow from the poles toward the equator at low levels and for warm air to flow from the equator to the poles at high levels.

The interchange of air between the equator and poles is influenced by the west-to-east rotation of the earth which deflects the winds. If you stand *facing*

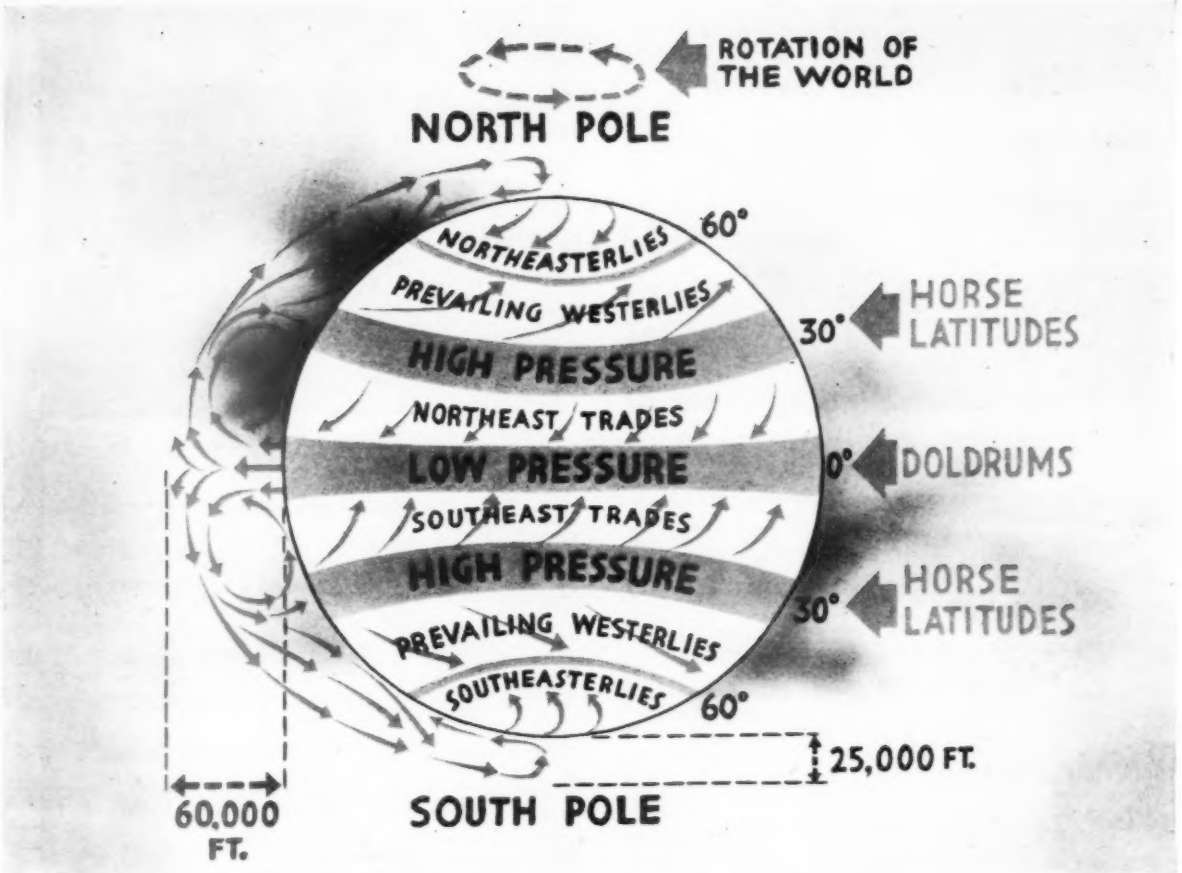
EDITOR'S NOTE

This article is a condensation of the Navy booklet "Air Masses and Fronts," prepared by the Training Division, Bureau of Aeronautics. It is No. 4 in the Navy's Aerology Series and is reprinted here because of its simple, lucid treatment of a complex subject — Aviation weather.





All weather occurs in the troposphere, which varies in thickness from about 60 000 feet in the tropics to about 25,000 feet over the polar regions. Clouds tower higher in the tropics.



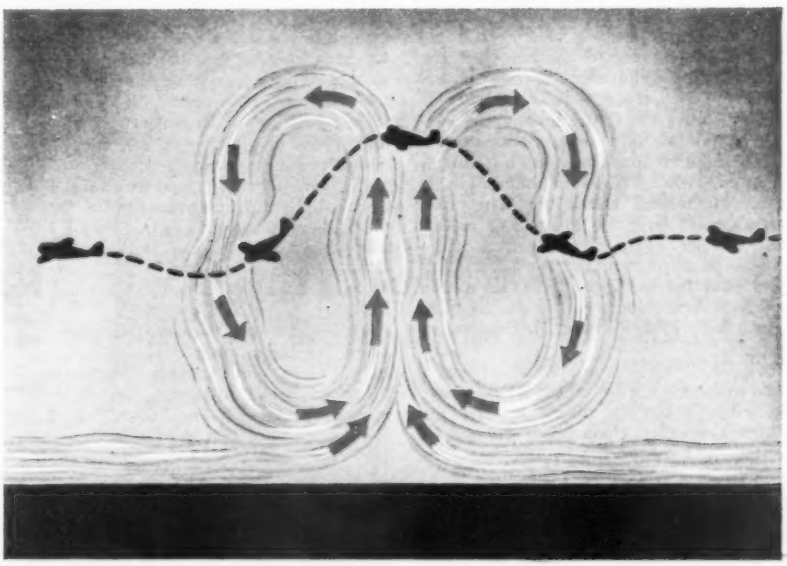
Air moves over the earth's surface in a fixed pattern. It is heated, expanded, and therefore rises over the equator, tending to flow toward the poles at high levels. From the high pressure areas in the polar regions it tends to flow outward at low levels.

the direction in which the winds are blowing in the northern hemisphere, winds, are deflected to your right. The reverse is true in the southern hemisphere. Because this rotation is a constant factor, atmospheric movement over various portions of the earth's surface holds to a fairly definite pattern.

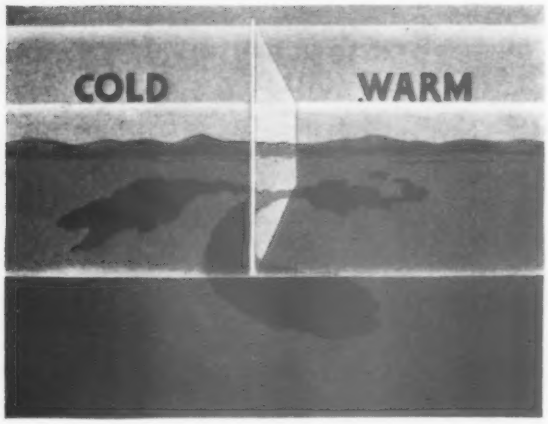
We can divide the northern hemisphere into three general zones, Zone A between the equator and latitude 30° north; Zone B between 30° and 60° north, and Zone C between 60° and the north pole. Zone A is bounded on the south by a belt of low barometric pressure called the "doldrums," where winds converge from both hemispheres and are very light and variable. It is an area of calms plagued by frequent showers, thunderstorms and heavy rainfall. The north boundary of Zone A is a belt of high barometric pressure known to many generations of seafaring men as the "Horse Latitudes." Here air currents are divergent and there is relatively low humidity.

Progressing northward we come to Zone B, bounded on the south by the high pressure belt of the Horse Latitudes and on the north by a low pressure belt referred to as the polar front, or sub-polar low, where winds are stormy and extremely variable. Since the winds flow from the high pressure toward the low pressure areas, with deflection to the right in the northern hemisphere, caused by the earth's rotation, the winds of Zone B are therefore southwesterly. Common parlance has shortened the designation of Zone B to the "region of stormy westerlies." These winds gain in strength as the latitude increases.

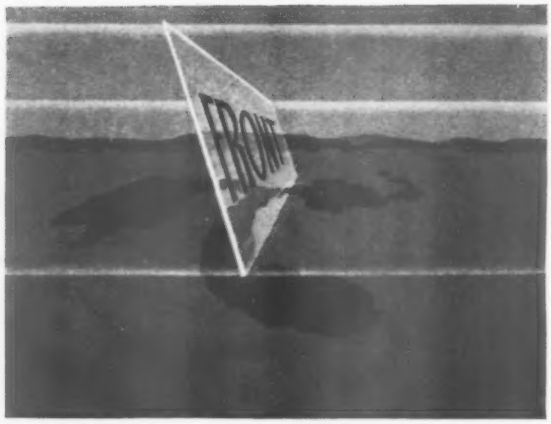
North of the polar front and lying be-



Warmed by contact with the ground, air rises, carrying the airplane with it and making the air "bumpy." This heated air may rise until its moisture condenses and becomes a cloud.

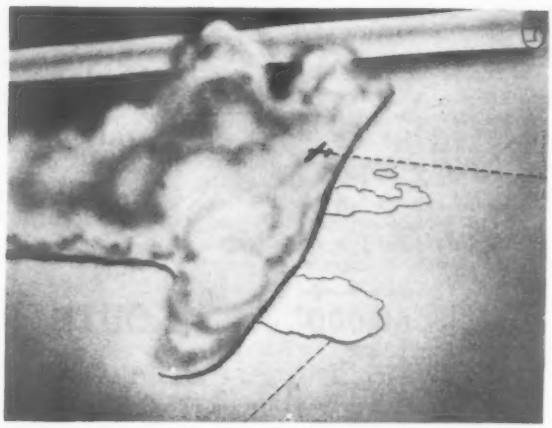


Cold and warm air masses do not mix. Their boundary is a "front."



Cold air is always heavier, therefore it slides beneath the warm.

The mobile line of a front is hundreds to thousands of miles long.



The warm air is forced to rise, moisture condenses and clouds form.

tween its low pressure belt and the high barometric pressure area at the North pole, is Zone C, where the winds, flowing from high to low pressure, are known as the polar easterlies.

Air that remains in contact with the earth's surface gradually acquires properties that are characteristic of the surface that underlies it. If the underlying surface is uniform and air currents are favorable, the air mass takes on a uniformity in a horizontal direction, notably in its temperature and humidity. This uniformity, which is the essence of an *air mass*, depends upon the source from which the air comes, and the path it follows after leaving its source. Its source and path determine whether the air mass is warm or cold, moist or dry, stable or unstable.

A cold air mass is one which is colder than the surface over which it is flowing, as when polar air flows toward the middle latitudes. Upon being warmed by contact with the surface of the earth, the air develops vertical currents, like those you see in a container of water on a hot stove. For this reason, a pilot flying through air that is being heated from below may expect to encounter rising currents which give him a bumpy ride.

Also, because of these vertical currents, the clouds encountered will be characterized by vertical development, called cumulus. If the path of air movement is over land, not much moisture is picked up and fair weather may be encountered, or there may be woolpack clouds in the sky. On the other hand, if the cold air mass travels over water it picks up much more moisture, which is carried to higher and higher levels, and cumulonimbus clouds producing showers may form.

Vertical currents in a cold air mass redistribute all factors that tend to reduce visibility near the ground. Smoke, haze and moisture are carried aloft and spread through a deep layer of air. Thus, cold air masses tend to bring good surface visibility.

Cold air masses can be recognized by pilots by bumpiness in the air and the cumuloform clouds created by vertical currents. Once he knows he is in a cold air mass and not near a "front," the pilot can be reasonably assured of some ceiling and visibility near the surface, no matter how unfavorable conditions may be aloft.

Any body of air which is warmer than the surface over which it moves is defined as a warm air mass. Most important sources of warm air masses are oceanic regions in the Horse Latitudes, although they also form over continents in the summer. There the air is warm, fairly stable and high in moisture content. When a mass travels toward colder regions, its lower layer becomes cooler and increasingly stable. This cooling hinders turbulence and completely shuts off any vertical currents, so that the air flow is almost entirely horizontal.

When flying in a warm air mass, a pilot will encounter smooth air and clouds of the stratiform or sheet type. In contrast with the cold air mass, the warm air mass tends to concentrate all factors that reduce visibility near the earth's surface. Fog may form, and surface visibility and ceilings tend to be low.

These characteristics can be easily recognized when the temperature difference between the air and surface is large. However, when the difference is slight, the change in surface temperature from night to day may change the air from a cold air mass by day (when the surface is warmed by the sun) to a warm air mass at night (when the ground has cooled by radiation).

The low pressure belt around the equator is the result of rising air caused by the sun's excessive heating in that region. As the air rises and flows toward the North Pole, part of it sinks at around

(*Continued on page* 122)

Building the SUPERFORT TEAM

A Superfort assigned to the transition school at Maxwell Field, Ala., makes a landing there with a student flight-crew at the controls.

From diverse special training schools, the 11-man Superfortress crew is painstakingly assembled and welded together into a team.

Revamped Liberators (AT-22's) have six B-29 flight engineer panels for group instruction.

PLANS for training and grouping specialized *Superfortress* crews were devised about the time the first prototype was being assembled. The early planning stage made obvious that new methods would have to be set up to prepare our airmen to fly, engineer and care for those sky giants.

Special training patterns were devised which embraced all men except the bombardier and the navigator. Their respective trades remained somewhat standardized and were not affected by airplane design. Before the bombardier joins the combat crew, he has been schooled in the *Superfortress* gunnery system.

The balance of the crew is subjected to rigid examinations and advanced schooling, with a searching physical examination weeding out those men unfit for the type of flying the *Superfort* requires. Pilots (known as airplane commanders) and co-pilots (designated as pilots) are carefully woven into the transition pattern. Airplane commanders must be graduates of the complete cadet pilot course and possess a minimum of 1,000 hours flying time, 105 of which must have been in four-engined craft. The right seat occupant, or pilot, must likewise have a total of 105 hours in four-engined planes.

In the beginning, Training Command graduates were combed to find the ablest four-engine pilots and co-pilots. Many had been in combat with *Flying Forts* and *Liberators*—others were four-engine instructors with many hours in the air as transition instructors. It was these flight crews who manned the first *Superforts* as airplane commanders and pilots.

By autumn of 1944 the pressure of the early part of the program was relieved. Boeing was producing the bombers at

Mechanic trainees aspiring to Superfort assignment "learn by doing." Nineteen weeks of sweat-and-grease includes thorough instruction on all parts of the 2,200-h.p. engines.

a faster rate and the whole training schedule settled down into a normal pattern. The AAFTC handled team transition and the Second Air Force concentrated on combat crew training. The first *Superfortress* transition school of the AAFTC was established at Maxwell Field, Ala. The main purpose was for the airplane commander, pilot, and flight engineer to "get the feel" of the big plane, go over the check list together, learn how to handle the flaps, practice take-offs and landings, including those made at night and practice flying with a propeller feathered. Early in 1945, Roswell Army Air Field, N. M., was converted to *Superfort* team transition. The summer of the current year will see the opening of other such schools.

The instruction system fosters teamwork. Instructors for the student teams work in pairs. One pilot instructor handles the pilots and a flight engineer teacher handles the flight engineers. Since the flight engineer is an integral part of the flight crew it is essential that his transition training be included with that of pilots. Each pair of instructors is responsible for four of the student trios and remains with them throughout the entire course.

Before the flight engineer's transition training, he is given a 10-week course in every phase of flight engineering. First classes were conducted at Sheppard Field, Tex., in April, 1943—50 enlisted men comprising the first group. These men were selected because of an excellent record in civilian and military education and a thorough background of mechanical experience on the flight line. At present, candidates selected for assignment to posts as *Superfort* flight engineers, are given a course consisting of six weeks of pre-flight engineering at the Amarillo Army Air Field, Amarillo, Tex., learning *Superfort* characteristics before entering the 10-week session at Lowry Field, Colo.

Following a trainee through this program, the first four weeks of training are devoted to superchargers, the 2,200-h.p. power plants, instruments, hydraulics and electrical systems and allied subjects. Aircraft recognition and aircrew first-aid are also taught during this period. Full-scale mock-ups of the respective sections insure thorough familiarization with location, operation and care of the multitude of intricate components of the giant bomber.

Starting the fifth week, the student-engineer tackles the instruments and learns how to "trouble-shoot" using logical engineering rather than trial-and-error methods. For example, should the needle on

(*Continued on page* 119)

Specialist-gunner candidates at the Superfort gunnery schools must be ambidextrous. They must simultaneously move the computing sight and turn the range wheel as they press the gun triggers with either or both thumbs.

Mechanic trainees aspiring to Superfort assignment "learn by doing." Nineteen weeks of sweat-and-grease includes thorough instruction on all parts of the 2,200-h.p. engines.

a faster rate and the whole training schedule settled down into a normal pattern. The AAFTC handled team transition and the Second Air Force concentrated on combat crew training. The first *Superfortress* transition school of the AAFTC was established at Maxwell Field, Ala. The main purpose was for the airplane commander, pilot, and flight engineer to "get the feel" of the big plane, go over the check list together, learn how to handle the flaps, practice take-offs and landings, including those made at night and practice flying with a propeller feathered. Early in 1945, Roswell Army Air Field, N. M., was converted to *Superfort* team transition. The summer of the current year will see the opening of other such schools.

The instruction system fosters teamwork. Instructors for the student teams work in pairs. One pilot instructor handles the pilots and a flight engineer teacher handles the flight engineers. Since the flight engineer is an integral part of the flight crew it is essential that his transition training be included with that of pilots. Each pair of instructors is responsible for four of the student trios and remains with them throughout the entire course.

Before the flight engineer's transition training, he is given a 10-week course in every phase of flight engineering. First classes were conducted at Sheppard Field, Tex., in April, 1943—50 enlisted men comprising the first group. These men were selected because of an excellent record in civilian and military education and a thorough background of mechanical experience on the flight line. At present, candidates selected for assignment to posts as *Superfort* flight engineers, are given a course consisting of six weeks of pre-flight engineering at the Amarillo Army Air Field, Amarillo, Tex., learning *Superfort* characteristics before entering the 10-week session at Lowry Field, Colo.

Following a trainee through this program, the first four weeks of training are devoted to superchargers, the 2,200-h.p. power plants, instruments, hydraulics and electrical systems and allied subjects. Aircraft recognition and aircrew first-aid are also taught during this period. Full-scale mock-ups of the respective sections insure thorough familiarization with location, operation and care of the multitude of intricate components of the giant bomber.

Starting the fifth week, the student-engineer tackles the instruments and learns how to "trouble-shoot" using logical engineering rather than trial-and-error methods. For example, should the needle on

(*Continued on page* 119)

Specialist-gunner candidates at the Superfort gunnery schools must be ambidextrous. They must simultaneously move the computing sight and turn the range wheel as they press the gun triggers with either or both thumbs.

TARGET: *Formosa*

1 Towed into position by a tractor tug, this Superfortress will be gone over minutely by its ground crew and its 2,200-h.p. Wright engines will be run up. If the plane checks out, it then will be fueled and bombed up. High temperatures on ground caused considerable engine overheating.

Of all American weapons today threatening the Japs at home, the Superfort is the deadliest. Here is a B-29 combat mission.

ASK an airman why he thinks our armed forces are fighting so hard for tiny, steaming volcanic islands nearer to Japan, and he will tell you that those islands are needed for *Superfortress* bases. Tinian is a case in point. The 70-ton giants will be able to carry far greater bomb loads from bases closer to Japan. Meanwhile, B-29's are effectively pounding the enemy from bases deep in China, India and Tinian. The mission illustrated on this and the following pages was flown by *Supers* based in China. Assuming these B-29's were based near Chengtu, they each had to carry enough fuel to fly a round trip of 2,800 miles. But the actual mission itself probably took between 10 and 10½ hours. Formosa (the Japs call it Taiwan) is a juicy target. It is highly industrialized, is rich in gold, silver, copper and coal. It produces rice, tea and sugar.

2 Guns are checked carefully. This B-29 had made three Hump trips, six missions, shot down one Jap. White bulge is radar.

3 Bombs for this Super are 500-pounders. They will be carried in two bays. Other bombs will be incendiaries, fragmentation.

4 Fragmentation (top) and incendiary clusters are timed to break apart in mid-air.

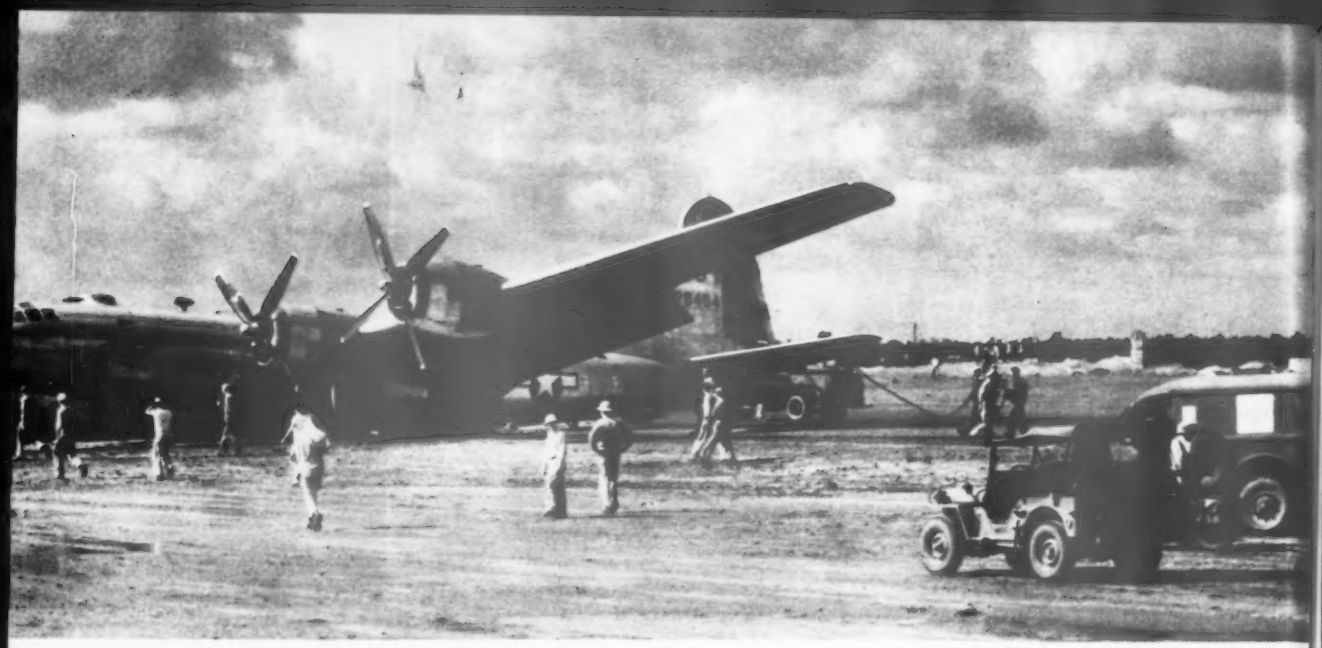
5 Ground personnel watch the early-dawn take-off for the Formosa raid. They "sweat out" a mission fearful lest one of their planes abort, skilfully repair those that are damaged on the raid.

7 Bombardier prepares for run over the target, seen dimly through clouds (lower right). Lead plane has already opened bomb bays.

8 "Bombs away"—30 of them (approximately 7½ tons). Hits will be photographed through port just forward the aft belly turret.

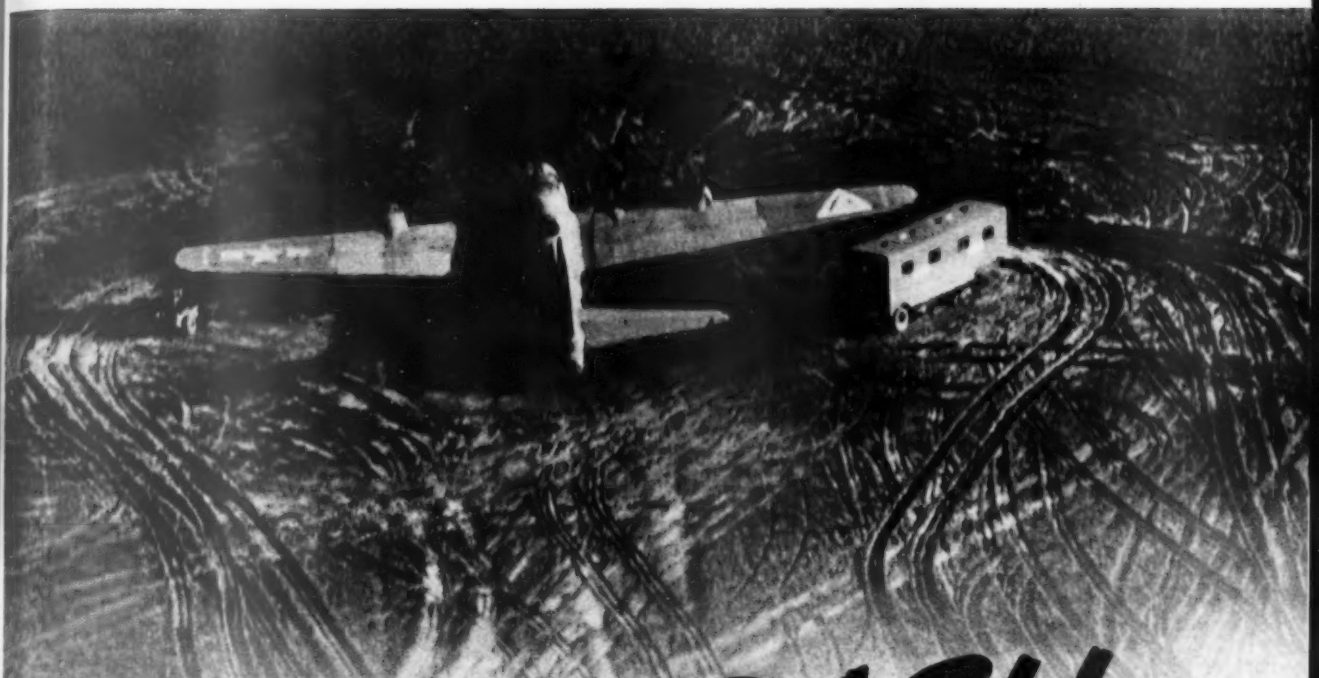
6 Crew members of one Superfort responsible for getting it to Formosa and back: (left to right) Capt. Edgar R. Skelley, pilot; Lieut. Raymond F. Tolzmann, co-pilot; and Lieut. John L. Wagner, navigator. Note pilot's throat mike and control-wheel button for intercom and radio.

9 Bomb pattern shows an almost complete coverage of shipping in Takao harbor, major staging point for Jap convoys. Simultaneously other raiding units inflicted heavy damage upon airfield, aircraft factory, supply depot, and railway installations of the island bastion.



10 Ground crews—mechanics, fire fighters, hospital corpsmen—converge on one casualty which, damaged by flak, has been forced to make a crash landing. Damage was extensive but plane was repaired on the spot where it finished trip from Formosa.

11 Formosa foray completed, Superfort crew is greeted by Maj. Gen.Curtis E. LeMay, commanding general of the 20th Bomber Command, as they enter intelligence office. Here every bit of information which might aid future raiders will be gleaned from them.



1 The Flying Fortress, "Sir Baboon McGoon," has been raised by jacks after landing on its belly in a British field. Wheel patterns indicate activities of repair crew.

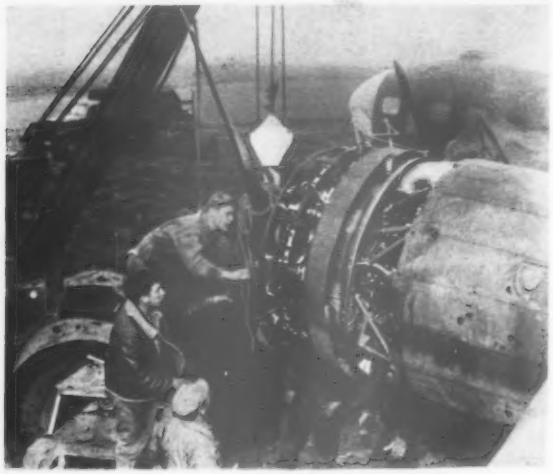
CRASH LANDING

Crippled by flak over Germany, this Fort limped home and crash-landed in England. An AAF mobile repair unit fixed it on the spot.

2 Grateful to be safe, one crew member kissed the ground. Mates thought he should have kissed Sir Baboon instead.

DAMAGED by enemy action on a bombing mission over the continent last summer, the *Flying Fortress, "Sir Baboon McGoon,"* staggered back over the channel and made an emergency belly landing in England. This unusual picture sequence, photographed by Harold Kulick, shows the step-by-step procedure by which an Army Air Forces repair crew made *Sir Baboon* flyable again. The *Fortress* was not seriously damaged for a belly landing, though chin and belly turrets were wrecked, at least one engine needed replacement, and the propellers were bent. The underskin of the empennage back of the belly turret was badly ripped by pieces of the turret which broke off with the landing impact. Readers of FLYING are familiar with the work of the photographer, whose pictures have illustrated many articles, color pages and covers of this magazine. A few days after taking these photographs, Mr. Kulick was killed in an airplane accident.

3 With mingled feelings, the crew looks over the damage done to their plane. The props are obviously in bad shape, the chin turret is bent into the nose, the belly turret is a total loss. But repair crew assures them that plane will soon be flyable.



5 A new engine and propeller are installed with the help of a truck-mounted crane. This nacelle was undamaged.

6 The belly turret bore brunt of the landing and sections of it shattered off on impact. The gunner was not in it.

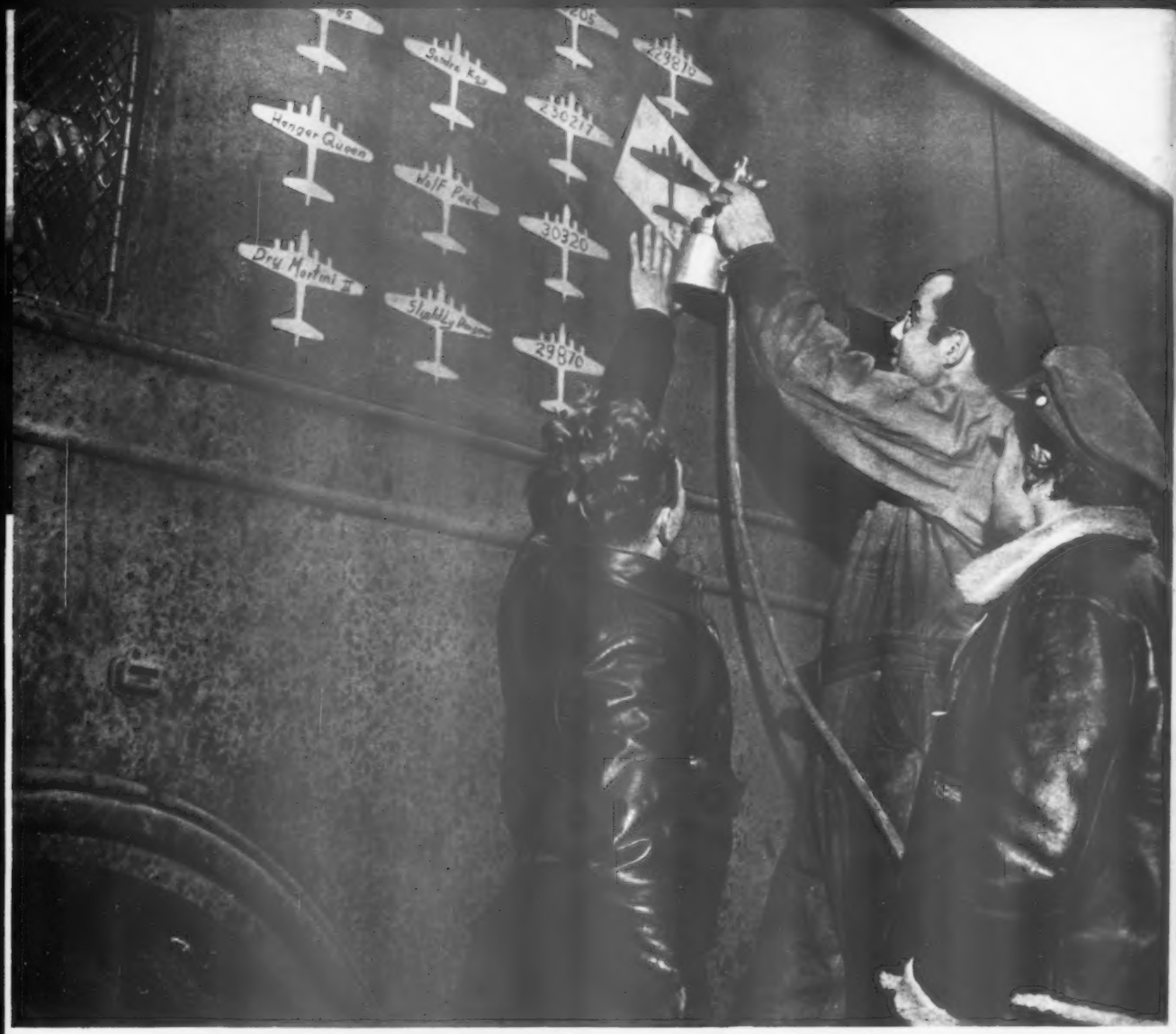
9 Crew member dismantles .50-caliber machine guns in tail of Fortress. Big repair truck in rear carries spare parts and equipment for doing minor machine repairs on the job. Silhouettes of Fortresses stencilled on sides indicate number of jobs done.

4 Huge balloon jacks, inserted flat between inboard engines and fuselage, raise Sir Baboon's 40,000-odd pounds easily. Wheels and other parts of plane's underside are checked carefully for damage. Note unusual bomb rack under wing close to fuselage.

7 A new Plexiglas nose is being fitted to plane. Note also that the chin turret and under skin have been removed.

8 Damage to turret was result of a 20-mm. cannon hit by a Focke-Wulf Fw-190 during plane's mission over Germany.

10 While repair job is under way, members of engineering unit level off ground, fill ditches and fix metal landing strips so that Fortress can take off when repairs are completed. Soft ground which enabled an easy landing would have endangered take-off.



11 The job done, repair crew members stencil Fortress silhouette on side of their truck. Some of the bombers repaired by this crew include the Dry Martini II, Hangar Queen, Patches, and Sandra Kay. The numbers are AAF designations of unnamed Forts.

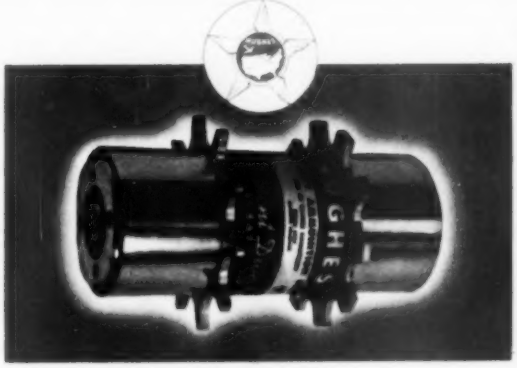
12 The Fort trundles down the metal landing strip, gathers speed and is airborne. The prompt action of Army Air Forces repair crews have enabled the AAF to keep additional hundreds of bombers in fighting trim for action against enemy war industry.

REPAIRS COMPLETED, 'SIR BABOON McGOON' PREPARES TO TAKE OFF FROM MUDDY STRIP.

A U. S. NAVY LSO, SEEN FROM THE COCKPIT OF A LANDING PLANE.

FASTER FIREPOWER . . . by HUGHES!

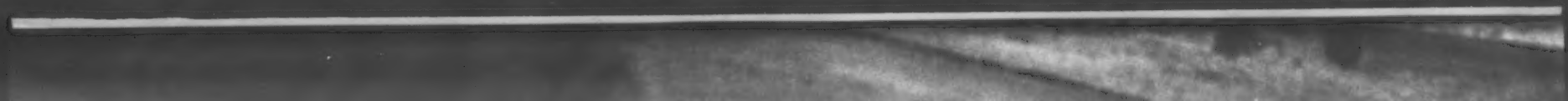
Through specialized and advanced design, Hughes' new H250 Heavy Duty Ammunition Booster provides faster firepower for 50-caliber guns substantially beyond the normal rate of fire. Into the manufacture of this Tool of War goes the accumulated knowledge gained by Hughes through conscientious research, experimental test and actual combat experience . . . The precision performance of this product merits our gunners' confidence.

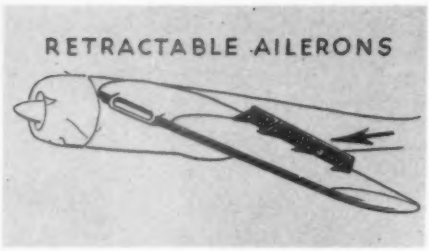


Armament Division **HUGHES AIRCRAFT COMPANY**

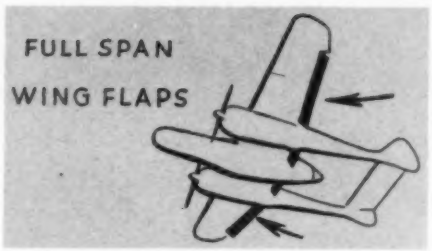
A UNIT OF HUGHES TOOL CO. • HOLLYWOOD 38, CALIFORNIA

AN AERONCA TANDEM TRAINER ON A CROSS-COUNTRY FLIGHT.





PERMIT



Retractable-ailerons . . . a Northrop contribution to slow landings . . . "hoverability" short take-offs . . . tight, fast turns

As long as ailerons took up space that could be used by longer flaps, stalling speeds were higher than they needed to be, landing speeds were excessive, and air strips too long and costly.

Now, there's an aileron which *frees* that vital space on the wing's trailing edge. It's the Northrop *Retractable-Aileron*—operating upward and out of the wing, well in front of the full-span flap.

This new and more efficient type aileron is the biggest single reason the Northrop Black Widow, despite its heftiness and speed, handles so easily . . . why it's such an "honest," reliable airplane.

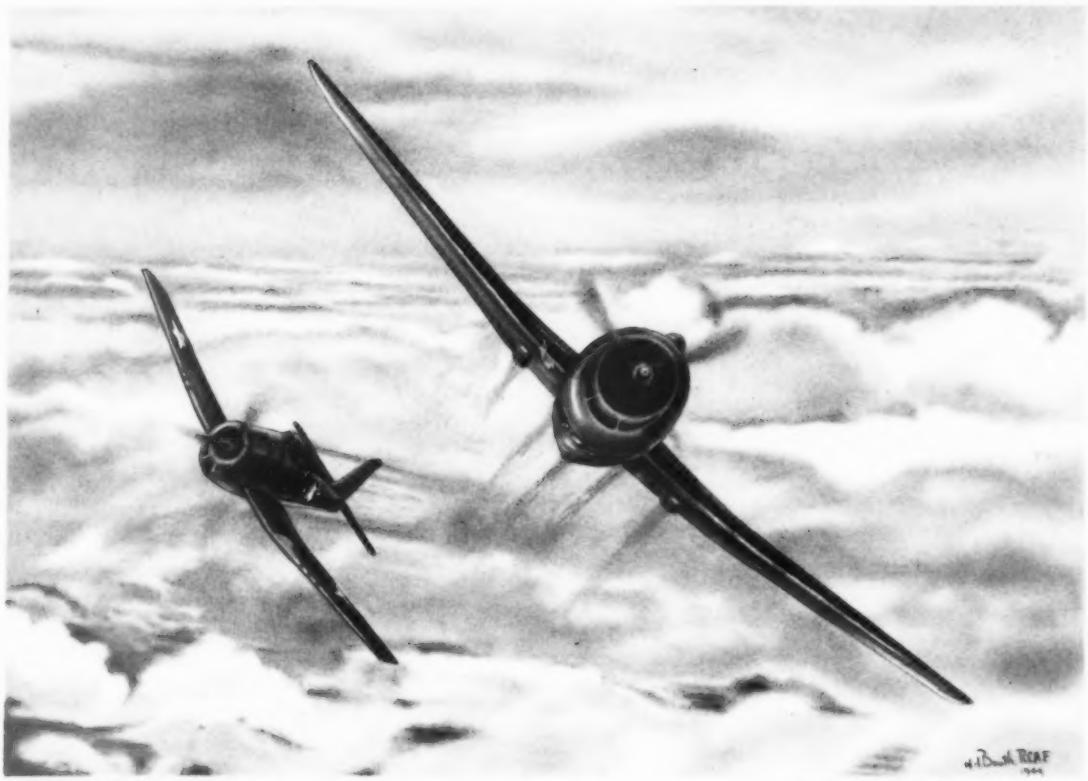
Retractable-ailerons and full-span flaps are but two of many advanced features on the Black Widow — features that have made this huge night-fighter more maneuverable, made it the master of the best Axis pursuits.

In peacetime, this Northrop achievement will contribute added safety and comfort through reduced landing and take-off speeds in passenger carrying planes. And in airports of the future it can mean a more economical use of landing strip space. Northrop Aircraft, Inc., Northrop Field, Hawthorne, Calif. Member Aircraft War Production Council, Inc.

NORTHROP *Creators of the* ***Flying Wing*** *and the* ***Black Widow*** *P-61 Night Fighter*

L
K
L
N
L
D
VF

LUSCOMBE FABRICATES METAL PARTS FOR THE GRUMMAN "HELLCAT"



GRUMMAN HELLCAT, U. S. NAVY

Courtesy Garden City Publishing Company

LUSCOMBE SILVAIRE

ALL-METAL PLANES FOR WAR AND THE LUSCOMBE ALL-METAL *Silvaire* FOR PEACE

Luscombe's whole history has been one of utilizing metal in aircraft. In pre-war years, Luscombe pioneered with an all-metal light plane... THE SILVAIRE. War-time experience has produced abundant evidence of the supremacy of all-metal construction. Luscombe has had the privilege of sharing in the development of vital fabricated metal parts used in many of the famous fighter planes of the United Nations. Following the war, the experience gained from years of 100% war production will enable us to offer a new, notably improved all-metal SILVAIRE. For further information, write Dept. FC.

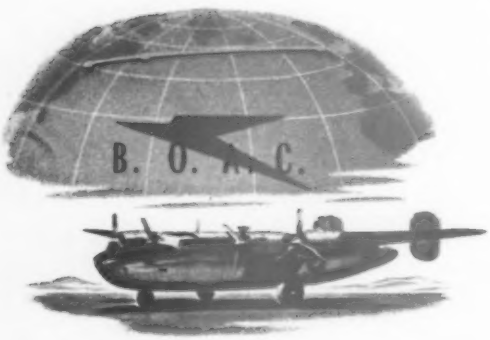
LUSCOMBE AIRPLANE CORPORATION, TRENTON 7, NEW JERSEY

Year Round Service *over the* North Atlantic

Over a 2000 mile North Atlantic route that often becomes 3000 miles against 90 knot headwinds, British Overseas Airways Corporation maintains year-round scheduled service on a trail blazed through some of the worst weather that ever beset an airline.

Heavily-loaded takeoffs, fast climbs to surmount treacherous icing conditions, and high-altitude cruising at sub-zero temperatures are among the requirements met by modified Liberators equipped with Curtiss Propellers.

This achievement is outstanding among the many transoceanic schedules now being maintained in all parts of the world by Curtiss equipped aircraft—forerunners of giant craft in which world travelers will find Curtiss automatic synchronizers and aerodynamic braking providing a new level of passenger comfort.



CURTISS
ELECTRIC PROPELLERS

Curtiss-Wright Corporation, Propeller Division

THE CASE FOR THE HUNGRY PILOTS

The chief danger in private flying isn't accident, fire or weather—it's starvation!

By
GEORGE REISS
Aviation Editor, the Youngstown, O., Vindicator

'How about a first-class hash-house on every airfield to supplant that hot-dog and milk diet offered flyers today?' asks this pilot.

PRIVATE aviation's No. 1 need isn't the simple, foolproof, two-control airplane, the chain of numbered landing strips, the cheaper hangar, more radio navigation aids, and simplified regulations—but a chain of first-class hash-houses.

That long, lean, hungry look in the eye of the oldtime flying instructor or aviation mechanic is a direct result of years of skipping meals, of nibbling candy bars and apples as substitutes. Private flying's chief danger, I'm firmly convinced, isn't accident, fire, or weather. It's starvation.

I'd as soon tackle a cross-country hop, even only an easy 100-mile jaunt, without a map, compass and weather report as venture forth without my lunch box, crammed to capacity.

Cross-country flying on an empty stomach is a hollow pleasure. There are fine eating places at the big airline terminals, to be sure, but terminals usually are not for the private flyer.

Take, for example, a hop my wife and I took recently. It seemed an easy enough flight, a business trip from my home in Youngstown, O., to Ford Airport at Detroit, a mere 250-mile, 2½- to three-hour jump in the Aeronca *Chief*, NC-34525. I planned to get into Detroit early, do my work quickly, and get home the same evening. That meant leaving before breakfast. So I gassed the Aeronca the night before, plotted out my course and was ready at daybreak. Youngstown airport then had no eating place but I recalled a side-of-the-road joint at Sandusky, O. airport, a good halfway spot.

"We'll get breakfast at Sandusky and save time," I assured Audrey.

How wrong I was. After we checked in at the Sandusky clearance office I said exultantly: "And now for a bit of breakfast."

"It's been closed," said the officer. "You could hitch-hike to town, of course . . ."

Now I'm one of those who must have his meals on time—and often. Miss one meal and I'm faint; miss two and life takes on a darker tinge; miss three meals —unthinkable.

But I had an important date in Detroit. Breakfastless, we flew on. There's no eating place at Ford Airport but there must be at adjacent Greenfield Village, Henry Ford's museum town, I thought. I left Audrey at the village, hurried to town and kept my engagement. Late in the afternoon I hurried back.

"Where do we eat?" I inquired. "I'm famished."

"I'm famished, too," complained the wife, "but the restaurant's closed."

No chance to get back to town for lunch if we were to get home by tonight.

"Well," I suggested, "we'll go on to Toledo. It's only 50 miles, it's on the way, it's got a big airport and it will have a good restaurant. We'll settle for a steak."

I hadn't visited Toledo airport before—but I was confident. We arrived at Toledo in a drenching rain. Visibility and ceiling were down to the minimum; even some airliners were grounded. Worse weather lay ahead.

"Well," I said jauntily, "at least we can eat. Where's the restaurant?"

Attendants pointed out a little wooden shack. That was Toledo's restaurant. Instead of thick juicy steaks, it served only hot dogs and milk. Worse, it had only two hot dogs and two small bottles of milk left. We took them both and the place closed for the day.

It was pouring and the airport manager's wife offered overnight accommodations to us strandees. So I offered Audrey the happy alternative:

"Shall we go to town, get a good meal, and get drenched? Or shall we stay, hungry but dry?"

She preferred to stay dry.

In the morning it was still raining. No chance to fly. And by this time we were shouting hungry. The stand wouldn't open for hours. Audrey wouldn't hear of begging a ride to town. She wanted to start as early as the weather would permit. Besides, our clothes already were soaked.

Folks at the airport carried lunches. We watched them nibble sandwiches, washing them down with coffee.

Tantalizing breakfast smells came from a home nearby.

"Maybe," I suggested, "If I knocked at the backdoor and asked the way to the

(*Continued on page* 112)

NOTAMS—Aviation's

Depicting purely imaginary data, this flight planning chart illustrates the information printed on Wenoa's regular charts.

WITH summer around the corner prospects are bright for the biggest light-plane season since the war began. It will be helped by the lifting of restrictions on civilian distribution of the Civil Aeronautics Administration's Weekly Notice to Airmen, the "cockpit newspaper."

Rulings of the armed forces have written "Wenoa's" new lease on life. The recent AAF ruling permits its distribution to civilians on the same basis as the aeronautical charts of the Coast and Geodetic Survey. As a result, experts are predicting it will treble its 20,000 circulation before summer's end.

Post-war prospects are even brighter. With the paper shortage eliminated, and assuming a post-war pilot population as high as 3,000,000, Wenoa might conceivably reach a circulation of a quarter of a million.

"Notams," aviation jargon for "notices to airmen," are divided into two classes: teletype notices and the publication "Weekly Notice to Airmen," jargoned "Wenoa." Teletype Notams differ from Wenoa in that they give immediate coverage of temporary airport and navigational aid conditions or the commissioning of new aids or the abandonment of old ones within a localized area. The Weekly Notice to Airmen is released weekly on a national coverage basis. Each individual teletype Notam covers only one facility and is available at only the one-fifth of the nation's airports with teletype facilities. The Weekly Notice to Airmen, on the other hand, gives the current status of all aeronautical facilities in the country and is available at every airport.

The first issue of the Weekly Notice to

Draftsmen enter changes on Wenoa's flight planning charts to indicate hazards or changes in airport and airway information.

News Service

Notams is airman's jargon for "Notices to Airmen," and covers both teletype communications and the weekly condition report on all aviation facilities.

By
Richard G. Aubry
Editor of Weekly Notice to Airmen and allied CAA publications

Airmen appeared almost 12 years ago, on June 27, 1933. The then-editor was John Groves, later manager of Washington National Airport, now director of operations, Air Transport Association.

The first issue was eight pages—a current issue will average 100-plus. The budget in 1933 allowed for seven employees and two publications, Wenoa and the Airway Bulletin (a directory of airports). Present budget encompasses 25 employees and seven publications, Wenoa, Directory of Airfields, Air Navigation Radio Aids (a tabulation of aeronautical radio aids and instrument flight charts), Instrument Approach Procedures (a tabulation), Danger Areas (graphic charts), Standard Broadcast Stations (data tabulation for direction-finding), and Official Airport Elevations.

In 1933 Wenoa reported on only 2,188 airports and 94 ranges, with no fan markers or voice-equipped airport control towers. Today, reports cover 3,374 airports, 415 radio ranges, 192 fan markers, and 532 voice-equipped airport control towers.

Speed of publication has kept pace with Wenoa's growth, both inspired by demands from pilots and operations personnel. Originally four days elapsed from deadline to mailing time. This interval has been reduced gradually until today it is less than 12 hours, earning the reputation of being the fastest-moving publication in the Federal Government.

Wenoa is designed to advise all flying interests on a weekly basis of the commissioning of new airports, radio facilities or beacons; of the abandonment or decommissioning of such aids; and of any temporary hazards, such as fields under construction or flooded. Surveys of flyers' opinions on the presentation of flight information were conducted annually before the war to determine its format, what it should contain, and how the contents should be presented.

Originally, Wenoa was a corrective to the aeronautical charts of the Coast and Geodetic Survey, various Army and Navy publications, and CAA (then Bureau of Air Commerce) Air Navigation Radio Aids and Directory of Airports. For example, news would come that a new airport was commissioned at Iowa City. The following week a full description of this field's location, size, servicing, etc., would be carried in Wenoa and pilots would correct or bring up to date their aeronautical charts and Directory of Airports. If it had been a new range the aeronautical charts would have been corrected.

This correction feature, then, was the primary purpose of the original Wenoa, plus itemizing temporary hazards in the form of rotating beacon or radio range outages (interruptions), or fields soft or under construction.

Today, in addition to acting as a corrective to other publications and listing all temporary hazards reported, Wenoa, by means of its flight planning charts, is well-nigh a combination directory of airports, air navigation radio aids, and danger areas, as indicated by the accompanying chart which depicts imaginary data. For that block of latitude and longitude on the map every active airport therein and on record with the CAA as of 0001 EWT each Thursday is indicated, as well as every radio facility, every airway, every danger or caution area, and every flight

(*Continued on page 137*)

Airfields equipped with teletype are only one source of Wenoa's data. From all sources about 1,000 reports are checked weekly.

Lieut. John W. Gittinger, USNR, aviation psychologist of the Naval Air Station at Memphis, Tenn., talks to a cadet in one of the formalized biographical interviews which comprise a part of the Navy's pilot tests.

The Psychologist PICKS A PILOT

Navy psychologists have vastly improved their means of selecting those pilots "most likely to succeed."

Capt. RICHARD G. HUBLER, USMC

AT THE start of the second World War in 1939 no one knew precisely what made a good combat pilot. Today, five years later, the secret formula of personality which makes a fighting flyer is still largely unknown. But some day soon the characteristics of the personnel of air power—within the limits of individual application—may be as recognizable as the performance of a specific type of plane. So say Navy psychologists.

The selection, training and combat evaluation of the men who are picked to fly and destroy has always involved the best and most uncompromising standards of the military services. But these were not enough. The original method of selecting Naval pilot material put most of the qualifying premium on physical perfection and educational achievement. If an applicant was a cut above the average in physique and possessed a college diploma, he stood an excellent chance to be accepted as a cadet. The rest was up to the screening process of indoctrination and training. This took the form of a practical rough-out of the experiences of most of the self-taught pilots, the pattern of flight training which had been developing during four decades.

As the technological development of the airplane proceeded at an amazing pace, the selection and training program of Naval pilots was left behind. Those in charge of the program felt, under the changing conditions of the instrument which their proteges had to use, that the usual standards were not enough. In the years just before the war, the "washouts" of military aviators ran as high as 50 per cent at some training stations.

As the war brought about an immense demand for combat pilots, it became apparent that the old procedures in selection were deficient in two further ways: they wasted time and money and they were not capable of turning out great numbers of expert pilots rapidly. Without combat experience to draw upon, the filtering of pilots through the selection and training periods had to become, in a relatively brief span, both measurably more strict and incredibly more productive.

To a great degree, the solution of this problem in the Navy was put up to professional psychologists. Today there is proof that they have greatly increased

Wave yeoman of the psychologist's office supervises mechanical comprehension test being given at the Naval Air Station, Memphis.

the efficiency of selection and the rate of pilot production in a job of applied research which will continue to the end of the war—and beyond.

The two main problems which faced the psychologists when they took over were both simple and staggering. Devising better and speedier ways of manufacturing combat pilots was a poser which had to deal first with selective methods, then with the training in the field and, finally, with persuading the Navy to adopt their sometimes radical recommendations on pilot selection.

The field of Naval aviation had been almost untouched by the psychologist. The combat pilot had no prototype. He was the direct result of an invention no more than 40 years old.

To those considering the factors in his environment, it seemed that he lived in a paradise of paradoxes. When he fought, he did so at a speed of between 350 and 400 m.p.h. where a mile goes by in a dozen heartbeats; when he relaxed, he did it utterly. Living was the object of praise and public notice but, when he died, his death was lost in mystery. He endured the terrible instant and yet had to live an ordinary life. What he killed was a shadow, a silhouette on his gunsight. Wielding one of the most deadly tools of war, he had almost no conception of the act of killing. A man, he was taught to be the soul of history's most complicated machine. Born

(*Continued on page* 100)

Lieut. E. R. Danzig notes comprehension of cadet during explanation of pattern and procedures at Glenview (Ill.) Naval Air Station.

Lieut. Marvin W. Stevenson, primary flight instructor, explains small field procedures while Psychologist Danzig notes reactions.

By Maj. OLIVER STEWART

British Authority, Editor of Aeronautics

GERMAN military ingenuity reaches a peak in the windmill kite fitted to U-boats, one of the most extraordinary gadgets of the war. Of more value to Japanese submarines working in the spaces of the Pacific than to Germans working—as they have been doing lately—close to the shores of Britain, it was brought out about a year ago. At least one has been captured.

It is a collapsible, man-lifting autogiro kite, consisting of an observer's chair to which is attached a lifting rotor. A control stick is in front of the chair. It is not a helicopter for there is no engine, the rotor being turned by the relative air stream as in the autogiro.

After the U-boat has surfaced the kite is assembled. Armed with binoculars, the observer takes his place and, after the rotor speed has worked up enough to provide lift, lets himself up at the end of a cable which carries telephone wires within it. On most days there would be enough wind at sea to fly the kite, but the submarine, by cruising into wind, could supplement the relative air stream as a boy runs with a toy kite. If the submarine is compelled to crash dive and to cut the kite loose the observer can jettison the windmill and open a back-pack parachute.

The kite gives a submarine a much bigger range of vision. Coastal Command of the Royal Air Force, in its ceaseless struggle against U-boats, has found the Schnorkel ventilating shaft (which allows the U-boat to remain submerged for long periods) a more serious trouble. But the windmill kite does help the submarine to spot its quarry.

Wing Commander R.A.C. Brie, England's greatest expert in rotary wing flight, showed your correspondent, long before war broke out, a toy windmill kite which worked on exactly the same principle as the German U-boat device. It could be flown in any wind of over about 12 m.p.h. War prevented this toy from being put on the market.

British Air Crashes

Comment has been made in the London daily papers and in the Houses of Parliament about accidents to British transport aircraft carrying official passengers following the accident to an Avro *York* which was carrying some of the Prime Minister's staff to the most recent conference between the President, Mr. Churchill and Marshal Stalin. The *York* is said to have crashed into the sea.

The loss of Sir Trafford Leigh-Mallory was recalled and the question was raised as to whether the aircraft was faulty or there was any inefficiency in the maintenance, flight planning, or pilotage.

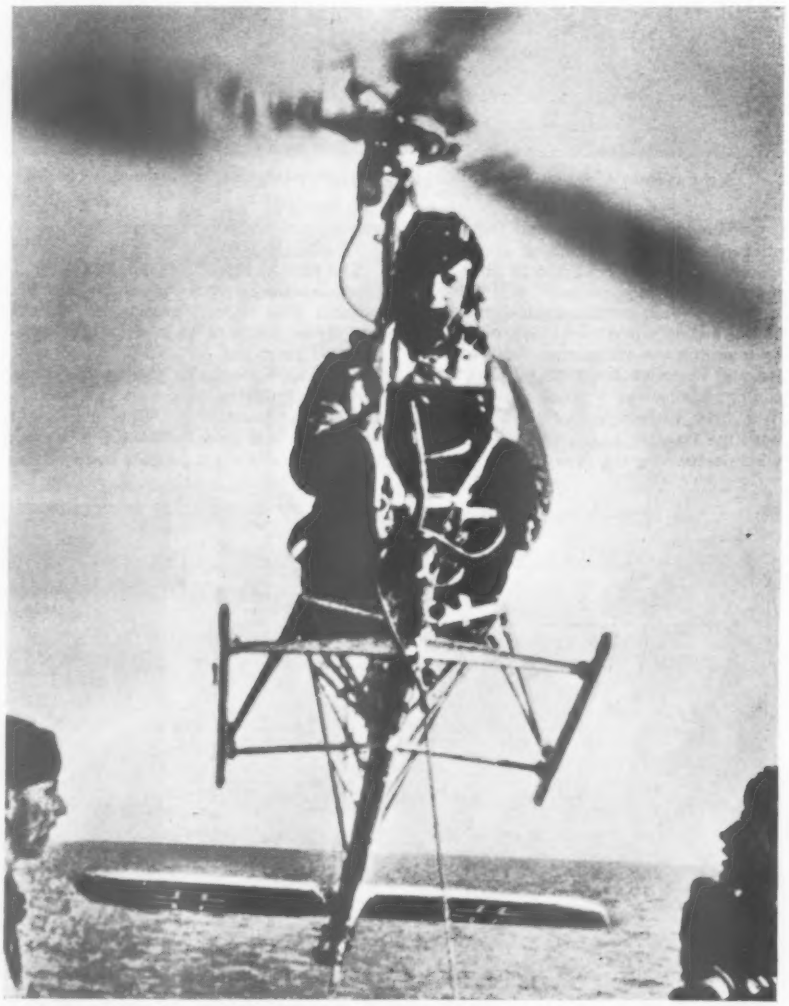
Parliamentary comment often seizes on special cases and neglects the general picture. During war, no full accident statistics are normally issued and there is no means of knowing if anxiety is justified. Most people here are satisfied with the assurance of the Secretary of State for Air that there is no cause for alarm.

Tons on Berlin

There was some surprise at the announcement that the daylight attack on Berlin, made February 3 by the 8th United States Army Air Force with fighter escort, was the heaviest yet. Until then Bomber Command of the Royal Air Force has been pre-eminent in the tonnage of its attacks. These comparisons between tons of bombs discharged tend sometimes to be misleading owing to discrepancies in the measures used. While both America and Britain refuse to standardize on the metric system and persist with their mad measuring system, their feet and inches and gallons and tons, this source of confusion will remain.

Arthur Narracott, air correspondent of the London Times, was one of the few to remember that 2,500 American tons weigh a good deal less than 2,500 British tons.

(*Continued on page* 140)

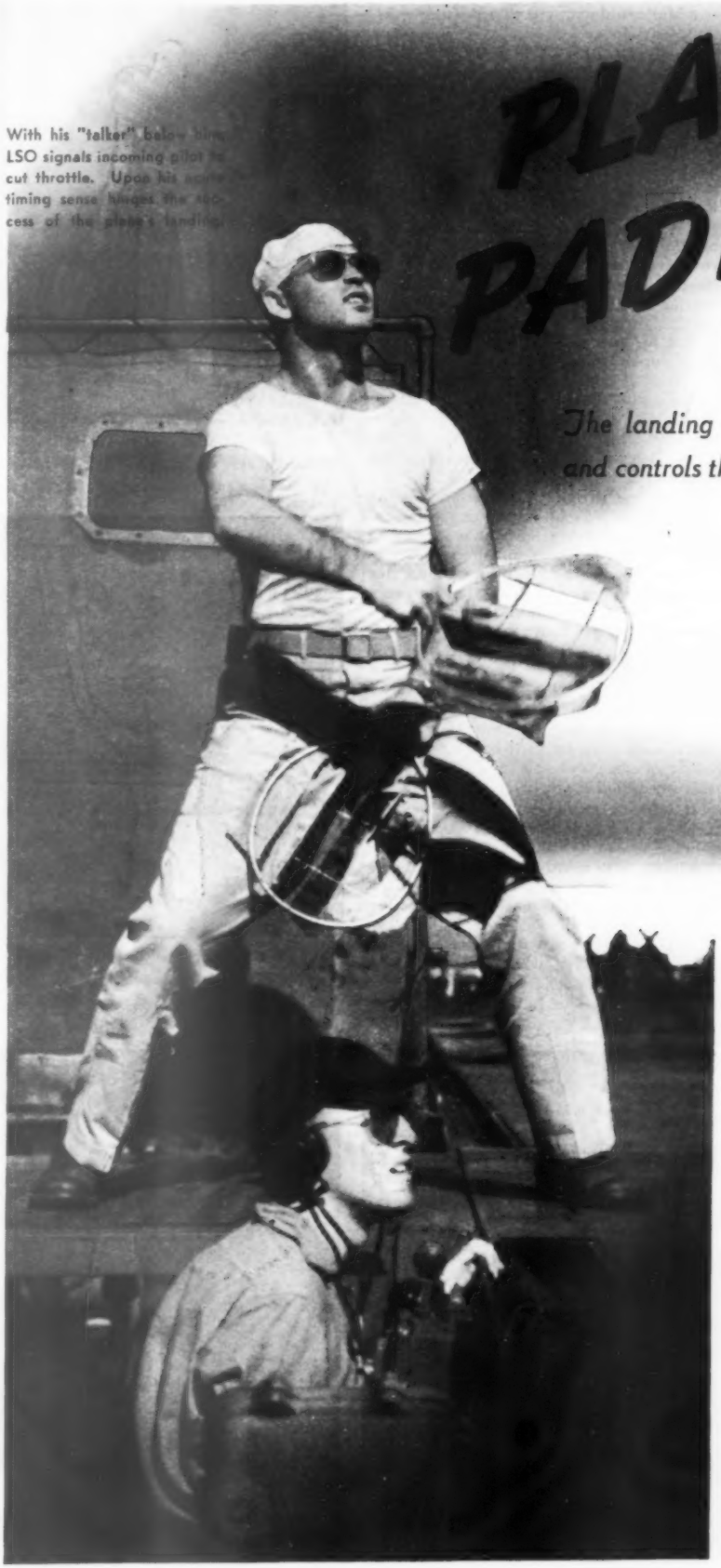


Rotary-winged kite towed by German submarine will raise observer high above ocean.

PLANE PADDLERS

By EDWARD DOHERTY

The landing signal officer directs the planes and controls the ship during landing operations.



With his "talker" below him, LSO signals incoming pilot to cut throttle. Upon his accurate timing sense hinges the success of the plane's landing.

MOST colorful guy on an aircraft carrier is the landing signal officer. His job is one of the most responsible and most dangerous—"second only to flying in combat," according to Comdr. David McCampbell, top-ranking Naval ace and squadron commander of the famous Fighting Fifteen which destroyed 314 enemy planes aloft and 348 aground —with an additional 388 probables. McCampbell himself served as an LSO for more than three years before he won his command of Fighting Fifteen.

To the casual observer the landing signal officer is the man dressed in a "monkey suit" who stands on a six-by-six-foot platform aft on the port side of his carrier and waves red and white paddles at the incoming planes. Actually he is in charge of the ship during landing operations. By means of his "talker," an enlisted man, he can order faster speed, a turn, or less speed. He's not in voice communication with the airplanes, but his signaled orders are law to the pilot making an approach to the flight deck. The success of each landing depends upon his split-second judgment of the altitude of the plane, and on the speed with which he signals the pilot.

Those *Corsairs* and *Hellcats* come in at only seven to 10 knots above their stalling speed. The pilots concentrate, not on their instruments and their positions relative to the runway, but on the LSO. When he signals "Roger," the pilot continues in. He cuts his throttle on a signal from the LSO. He knows that if he follows the LSO's instruction he almost never gets into trouble on landings.

If he doesn't follow those instructions, he may find himself grounded. A squadron commander on the *Wasp*, who outranked the LSO by a stripe and a half, thought his judgment superior and ignored a wave-off. Within a matter of minutes he found himself trying to explain the action before the Air Officer. That gentleman reminded the pilot of the unquestioned authority of the LSO and relieved him of flight duty for a month.

Beginning LSO's may rank no higher

than lieutenants (j. g.), although all are subject to regular Navy promotions. But regardless of rank, each is backed by all the authority of Navy regulations and traditions. Responsible directly to the air officer, the signal officer is thus a man widely respected on a carrier. Except in a few instances he is a pilot himself and an excellent one. In off hours he is most often found in the ready room talking to the combat aviators about their flying. He knows them all well, coaches them in eliminating recurrent mistakes, learns their personalities so he can gauge their reactions, and in general wins the confidence of the other men, even those senior to him.

Standing on an exposed platform only a few yards from the flight path, the landing signal officer is in a precarious position. Some have been killed, others injured, when hit by landing aircraft. To forestall some of these accidents, a net is placed behind and below the LSO's platform into which he can leap when danger is imminent. (Some carriers have chutes leading to a lower deck, into which the officer merely steps.) "That net comes in handy quite often," McCampbell said. "I remember one time, though, when a kid got excited and jumped too hard. He went right over the net and into the ocean. A destroyer fished him out later, unhurt. That boy spent a long time living down the title 'eager beaver.'

"There was one time I used the net, not to save my own life, but to save somebody else's," McCampbell reminisced. "It was on the second trip of the old *Wasp*, since sunk, ferrying *Spitfires* from England to Malta. You remember—things weren't so good for the British in early '42 in North Africa. The Jerries were bombing Malta regularly and the only way Britain could get replacement fighters there was to ferry them in on carriers.

"Of course the *Spits* weren't built to fly on or off carriers; they had no arresting gear and their pilots had no training in ship work. But we used to carry them to a point in the Mediterranean between Gib and Malta and, using auxiliary fuel tanks, they'd fly the rest of the way. The pilots would learn something of the technique by watching our planes land and take off to provide fighter cover against subs and enemy aircraft.

"This RAF kid, named Smith, had never flown a *Spit* before—he had only 138 hours total flying time—but he managed his take-off okay. Shortly afterward he lost his auxiliary gas tank. He didn't have the range to get to a field in either Gib or Malta, so we gave him the choice of returning to land alongside us or to try landing on the carrier. He chose the carrier landing and we got ready for a crash.

"As he made the first approach the whole crew was standing by, tense. He was coming in high and fast. I gave him the wave-off signal but of course he didn't catch on. I thought he must know it meant danger if I jumped into the net. So I did. He got the idea and went around for another try.

"He came in for a perfect landing the second time. We all held our breath, because it takes scores of practice hours to learn carrier landings and here was this kid Smith who had never seen a carrier 10 days previous, much less land on one, trying it in a hot land-based plane without arresting gear. It was as nice a landing as I've ever seen, and believe it or not that plane stopped just six feet from the barrier.

"We all rushed up to congratulate him on the miracle, but he climbed out of the plane nonchalantly, as if he made carrier landings every day as a matter of routine. He was killed a week later over Malta."

It takes a special knack to be a good LSO, according to Comdr. L. B. Southerland, Assistant Director of Aviation Training, but mostly it takes a concentrated period of training that may last more than a half-year, plus practice, practice, practice.

Men are asked to volunteer for the job —preferably pilots who have finished a tour of duty in combat. Unfortunately

(*Continued on page* 108)

On receiving signal, pilot cuts throttle and takes his eyes off LSO for the first time to guide plane to three-point landing.

Pilot drops nose, then eases off throttle until LSO signals "Roger." Then plane nose is raised to hold the new altitude.

Signal indicates that landing flaps are not down. Paddles are opened with a whole arm motion, closed with a flapping motion.

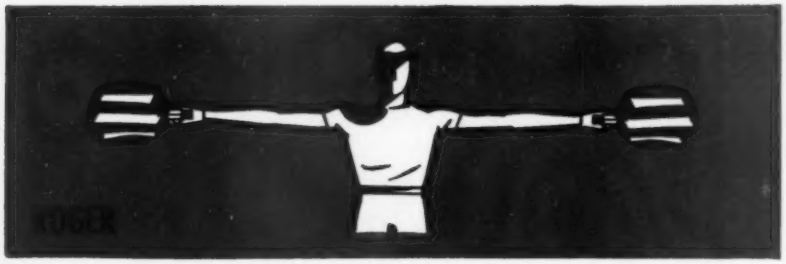
Sometimes a difficult signal to answer. If possible pilot eases off throttle and pulls nose up slightly to keep at same altitude.

LSO takes both paddles and rotates them in a wide circle, mimicking the old hand-crank method of lowering wheels.

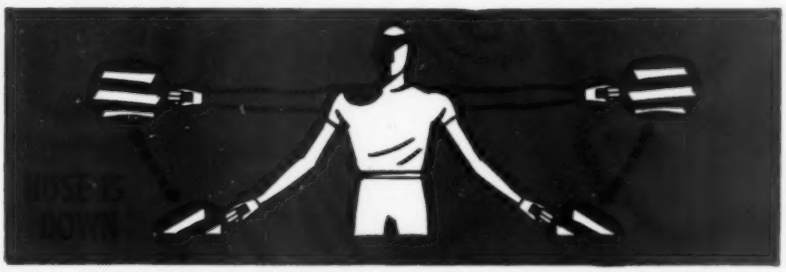
Mandatory signal—the pilot must not land under any circumstance. To give signal, LSO crosses paddles rapidly over his head.

Pilot should add throttle, then climb until he receives "Roger," then level off and reduce throttle to keep proper speed.

The signal is a chopping movement toward the deck with both paddles. On a field it means to land and stay on ground.

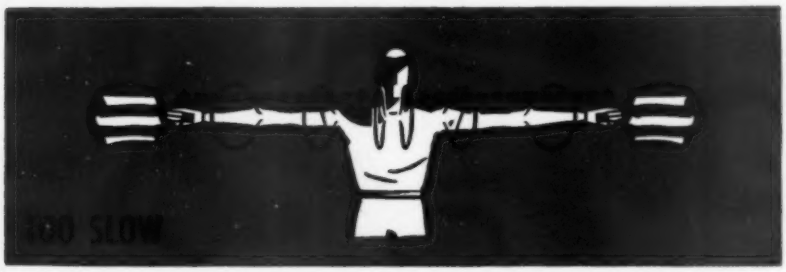


This is the semaphore signal for the letter "R". It is kept as long as the plane maintains right approach, but the moment plane is out of position a correcting signal is used.



Also called "Low Dip," this signal tells pilot to ease plane's nose up but not add throttle. It may follow a "Fast" signal. Arms start at "Roger" and return after dipping.

Sometimes called "High Dip," this signals pilot to ease nose off slightly to cause a drop of 10 to 20 feet and immediately return to original attitude. Throttle is unchanged.



Navy flyers also call this the "come on." Pilot answers by adding throttle but without climb. Throttle is added in accordance with the rapidity with which LSO gives the signal.

Also called "Slant," this signal is given by inclining the arms to left or right from "Roger." It indicates that rate of turn into groove is insufficient or, close aboard, to get wings level. Because of precision required, landing practice is carried on even when crews are not afloat.

Most pilots differ radically in their notions of how an airplane should be flown. One often-argued question has been...

IS THE STALL LANDING OBSOLETE?

Many pilots dislike the full-stall landing, done here by a Taylorcraft.

By JOHN R. HOYT

YOU'RE coming in for a landing. The wind is strong and gusty. The runway is short, slightly out of the wind, and you haven't flown the airplane enough to be too sure of it. Still, it is a conventional type of craft: light, stable, monoplane, excellent brakes. What kind of landing are you going to make?

Granted that you're going to try to make a *good* one. But just what kind of landing is most likely to be a good one? Which kind is best for the airplane and for you, all things considered?

The answer to that question should *not* be given in a split second, as would be the case if you were actually making an approach under the conditions outlined. It most certainly should be answered, however.

Regardless of whether we are flying conventional tail-wheel or nose-wheel equipment, we have to contend with two types of landings. Regardless of whether one must use stall or three-point landings on an airplane carrier and wheel landings in a tricycle-geared airplane like the *Lightning*, we can define the landings and consider them on the basis of merit alone.

The full stall (also called three-point, or tail-wheel) landing is commenced with a normal glide or perhaps slightly less than normal. At the end of the glide, which is held very precisely and accurately all the way in, the nose is eased up to "break" or "flare" the glide. The plane lands, usually, at a spot that varies considerably because of wind, accuracy of glide, amount of throttle held during the glide, number of r.p.m.'s at engine-idling speed, and the ability of the pilot to hold the plane off until the wing is fully stalled. A real full-stall landing, however, is not acceptable to many pilots, and especially the Navy, unless the glide is slow enough so that the plane lands without appreciable float—as a matter of fact, many pilots want the plane to land almost at the end of the glide path, in a "stall-down" landing.

This calls for plenty of technique and alertness because a quick turn or a sharp tug on the stick will raise the G's, stall the wing, and cause a spin. The plane is finally landed in a three-point attitude, meaning that the two wheels and the tail wheel strike the ground simultaneously. This should occur from an altitude of not over six inches. It may be less if the pilot is clever, or it may be more if the pilot has doped off. Just how hard a plane hits from any altitude can be solved arithmetically, as will be shown in a moment.

The wheel landing is begun from a normal glide, or perhaps slightly higher. The gliding speed is held precisely and accurately, but in this case the power is

usually on, whereas in the stall landing the power usually is off. The airplane is held in a gliding attitude with the elevators, and the airspeed is maintained (during the last mile or so) by the throttle. How it is possible to do this will be described later. The plane lands, and the throttle is closed, precisely and exactly where the pilot intends to land, ordinarily at the rear-most end of the runway. However, nowadays with two-mile runways it is generally more practicable to decide just *where* one wishes to land his lightplane and then to land there, a bit closer to the line.

In any case, the plane is put down, not where the wind, glide, or engine pre-determine, but where the pilot decides to land. How this may be done also will be described here. The landing itself is, as may have been anticipated, on the wheels in a flight attitude with plenty of airflow over the wings and tail. The landing may be accomplished at rates of descent varying from 10 to 600 feet-per-minute. The force of the impact in relation to a full-stall landing may be solved easily arithmetically.

In these definitions, it is notable that neither type offers a haphazard approach; each is precision flying. Neither permits the habit of "letting the plane fly you" and the wheel landing, if anything, is more precise than the other. Must it be, necessarily, the harder? Let's go through our gusty-day procedure and find out. It will be recalled that we were making an approach in a strong wind, severe gusts, a conventional lightplane, and in a slight crosswind.

First, any pilot would wonder just how strong those gusts are. If he got on the ground and eased the stick back, he could easily find himself airborne and flying backwards. Or, he could find a wing coming up and the ailerons ineffective. In other words, we know for certain that gusts are treacherous and can leave us fresh out of airspeed at an altitude from which we might not be able to recover control.

Second, a pilot would know that a freshening gust could cause him to become airborne and lift him 10 feet or so; a decreasing gust could cause him to lose airspeed in his glide. So he would want a gliding speed several miles faster than a normal glide. There is only one way to "control" an airplane, and that is by means of airspeed. But airspeed is a term that usually connotes *stalling speed plus more speed.*

Third, it might even appear to be a pious idea not even to get near the stalling speed during this landing. So, about the time we reach the "key" position on the downwind leg, where we ordinarily chop the throttle cold and glide in toward the field, we conservatively establish a glide that is safe. Let's examine a few glides and see how they differ.

THE MAXIMUM GLIDE. This glide has been called the "long-distance," the "normal-plus," or "floating" glide. It can be determined simply by this rule:

Maximum glide = stalling speed plus 60 per cent.

So if your lightplane stalls at 39 m.p.h., 39 × 160 = 62 m.p.h. (approx.)[1] it is slightly on the fast side, but it is *safe.* It isn't too fast, providing the pilot holds it accurately. It is very valuable because a plane usually glides farthest (most efficiently) at this speed.

THE NORMAL GLIDE. This glide has been called the "precision," "accuracy," "non-float" glide. It can be determined simply by this rule:

Normal glide = stalling speed plus 40 per cent.

Thus if the plane stalls at 39 m.p.h., 39 × 140 = 55 m.p.h. (approx.). It is a good glide, quite comfortable, accurate and safe. It is not as efficient as the maximum glide and should not be used in trying to reach a distant field. Also, a 15-mile negative gust, which isn't uncommon, would leave the pilot with a margin of one mile above stalling. This is not so good.

THE MINIMUM GLIDE. This has been called the "graveyard" glide, etc. It is used to advantage, however, in emergencies when a plane *must* be landed on a given spot with a minimum forward roll. It is dangerous, but the rate of descent is so rapid and constant that it is easy to judge the landing position. Some instructors teach it in the last part of a spot landing. It may be computed by this rule:

Minimum glide = stalling speed plus 20 per cent.

If your plane stalls at 39 m.p.h., 39 × 120 = 47 m.p.h. (approx.). A slight gust would literally blow one away. Don't use it on a gusty day, or on any other day except when it is needed. Then be careful.

With this in mind the pilot reduces the throttle and makes his turn into the field, pointing the nose at the particular spot on which he is determined to land: say about 50 feet in diameter. Next, he must combine attitude with maximum glide. Here is how the attitude and the airspeed are controlled: by pointing the plane at the spot, the glide path and attitude are established. Then by decreasing the throttle he brings the airspeed down, or by increasing it, the airspeed rises. Obviously, to commence such a maneuver from 5,000 feet would result in a dive. The correct distance and height depends upon the type of plane but usually this distance is from a position in the conventional traffic circle.

In any event, the airspeed must be kept constant (stalling speed plus 60 per cent) by use of the throttle, as this is a precision maneuver. It can be done both

(*Continued on page* 124)

[1] All figures for glides must be taken with certain reservations. A heavy load, severe icing conditions, turbulence, etc., will require higher gliding speeds. *Know your plane* before accepting an arbitrary gliding speed. It is impossible to give a rule, number, or percentage for every airplane in every situation.

The wheel landing, with the airplane flown onto the runway under full flight control, has been standard practice on the airlines for years. This DC-3 is about to touch down on two main wheels. It rolls down the runway, tail high, the tail dropping gradually as speed decreases.

Jap Aircraft

ALLIED code names for Japanese aircraft are based partly on our need for clarity and convenience and partly on the Jap's own systems. The convenience has led us to substitute easily understood code nicknames for the unpronounceable Jap names. But there is a system to this, too. It was officially adopted and expanded towards the end of 1942 and uses these three rules:

1. All Japanese fighters and float planes are given boys' names.
2. All other planes are given girls' names.
3. All Japanese transports are given girls' names beginning with "T."

More recently, numerals have been added to the code nicknames to indicate the model or "mark" number. The Japanese navy planes are given two numerals, the army planes only one numeral. This is not the arbitrary whim of the Allied aircraft identification experts; it is based on the Japanese system.

In Japanese naval plane model numbers, the first numeral relates to the airframe and the second numeral to the engine. The number progresses with subsequent development of the plane. For example when *Zeke 11* became *Zeke 21*, that meant that the airframe had been changed while the engine remained the same. When it became *Zeke 22*, both the airframe and engine had been changed from *Zeke 11*. In *Zeke 32*, still another airframe change was noted, and the latest known model, *Zeke 52*, therefore has its fifth airframe production design but only its second engine production design. Japanese naval aircraft also have a model type symbol system which is too detailed to be explained here.

Japanese army planes, of course, use a different system. Once an airplane is in production it is given an approved designation which consists of the manufacturer's name, the type number consisting of the year production was started, and a purpose and model numeral. It is this latter single model number which is used with the Allied code nickname designation. The second development of *Oscar 1*, for example, becomes *Oscar 2*.

The following list of planes has been compiled by the editors of FLYING from authoritative sources. Every effort has been made to make it as complete and as accurate as possible. Because of the veil of secrecy surrounding our identification of Japanese planes, however, the descriptions cannot be taken as official. END

JAPANESE ARMY AIRCRAFT

Code Name	Manufacturer	Span Ft.	Span In.	Speed in m.p.h.	Range in. mi.	Engine Mfr.	Take-off h.p.
FIGHTERS							
Frank 1	?	?		420	650	?	?
Fred	Focke-Wulf Fw-190	34	5	390	525	B.M.W. 801	1,600
Mike	Messerschmitt Me-109	30	3	350	400	Daimler-Benz	1,150
Nate	Nakajima	35	9	280	640	Nakajima	800
Nick 1	Kawasaki	49	6	350	1,300	Mitsubishi (2)	1,050 ea
Nick 2	Kawasaki	49	6	375	1,600	Mitsubishi (2)	1,150 ea
Oscar 1	Nakajima	37	9	330	750	Nakajima	955
Oscar 2	Nakajima	37	9	342	750	Nakajima	1,150
Tojo 1	Nakajima	31	10	?	?	Nakajima	1,250
Tojo 2	Nakajima	31	10	370	800	Nakajima	1,450
Tony 1	Kawasaki	39	4	360	1,900	Kawasaki	1,100
Tony 2	Kawasaki	39	4	365	?	Kawasaki	1,100
BOMBER-RECONNAISSANCE							
Ann	Mitsubishi	48	0	?	?	Mitsubishi	1,450
Babs 1	Mitsubishi	39	4	?	?	Nakajima	1,250
Babs 3	Mitsubishi	39	0	?	?	Mitsubishi	1,450
Dinah 2	Mitsubishi	48	3	360	1,700	Mitsubishi (2)	1,050 ea
Dinah 3	Mitsubishi	48	3	385	1,000	Mitsubishi (2)	1,450 ea
Ida	Mitsubishi	39	5	?	?	Mitsubishi	1,450
Helen 1	Nakajima	66	7	345	?	Nakajima (2)	1,450 ea
Lily 1	Kawasaki	57	10	285	1,200	Nakajima (2)	1,250 ea
Mary	Kawasaki	47	7	236	?	Kawasaki (2)	900 ea
Sally 1	Mitsubishi	73	0	248	1,200	Mitsubishi (2)	870 ea
Sally 2	Mitsubishi	73	0	264	1,000	Mitsubishi (2)	1,000 ea
Sally 3	Mitsubishi	74	5	285	?	Mitsubishi (2)	1,450 ea
Sonia 1	Mitsubishi	?		?	?	Mitsubishi (2)	900 ea
TRANSPORTS							
Thelma 1	Tatikawa	65	6	256	?	Kawasaki (2)	950 ea
Teresa	Nakajima	?		205	527	Nakajima (2)	450 ea
Tess	Nakajima	85	0	?	?	Mitsubishi (2)	850 ea
Thora	Nakajima	65	4	230	1,520	Nakajima (2)	400 ea
Topsy	Mitsubishi	74	0	266	1,865	Mitsubishi (2)	850 ea

JAPANESE NAVY AIRCRAFT

Code Name	Manufacturer	Span Ft.	Span In.	Speed in m.p.h.	Range in. mi.	Engine Mfr.	Take-off h.p.
FIGHTERS							
Dick	Republic (U. S.)	36	0	320	600	P&W Twin "Wasp"	1,050
Claude	Mitsubishi	36	2	250	440	Mitsubishi	730
George 11	?	?		400	650	?	2,000
Irving 11	Nakajima	55	0	350	1,900	Nakajima (2)	1,100 ea
Jack 11	Mitsubishi	35	5	400	1,100	Mitsubishi	1,800
Rufe 11	Nakajima	39	5	280	1,200	Nakajima	1,050
Zeke 21	Mitsubishi	39	5	320	1,500	Nakajima	900
Zeke 22	Mitsubishi	39	5	300	1,000	Mitsubishi	930
Zeke 32	Mitsubishi	39	2	340	1,500	Mitsubishi	1,400
Zeke 52	Mitsubishi	39	2	350	1,500	Mitsubishi	1,400
BOMBER-RECONNAISSANCE							
Alf[1]	Kawanishi	45	10	?	?	Kawanishi	?
Babs 2	Mitsubishi	39	0	?	?	Mitsubishi	1,450
Dave 11[2]	Nakajima	36	1	180	800	Nakajima	650
Jake 11[2]	Watanabe	47	5	250	1,500	Mitsubishi	1,050
Jill 12	Nakajima	52	0	310	2,000	Mitsubishi	1,500
Judy 11	Aichi	37	9	350	2,000	Aichi	?
Judy 12	Aichi	37	9	350	2,100	Mitsubishi	1,400
Kate 12	Nakajima	50	11	225	1,800	Nakajima	1,000
Paul 11[2]	Aichi	42	0	?	?	Mitsubishi	?
Pete 11[2]	Mitsubishi	36	0	240	650	Mitsubishi	?
Val 11[1]	Aichi	47	7	240	1,200	Mitsubishi	1,050
Val 22[1]	Aichi	47	7	250	875	Mitsubishi	1,050
BOMBER-RECONNAISSANCE (2-engine)							
Betty 11	Mitsubishi	82	4	275	1,200	Mitsubishi (2)	1,050 ea
Betty 22	Mitsubishi	?		330	2,800	Mitsubishi (2)	1,800 ea
Cherry	Kawanishi	77	0	?	?	Unkn. radials (2)	?
Frances 11	Yokosuka Arsenal	?		350	1,100	Nakajima (2)	1,600 ea
Frances 12	?	?		360	1,600	Mitsubishi (2)	1,600 ea
Nell 22	Mitsubishi	82	0	230	2,200	Mitsubishi (2)	1,600 ea
BOMBER-RECONNAISSANCE (4-engine)							
Emily 11	Kawanishi	124	0	250	4,100	Mitsubishi (4)	1,450 ea
Emily 22	Kawanishi	124	0	300	4,100	Mitsubishi (4)	1,450 ea
Liz 11	Nakajima	115	0	?	?	Nakajima (4)	1,600 ea
Mavis 11	Kawanishi	131	0	215	3,900	Mitsubishi (4)	1,050 ea
TRANSPORTS							
Tabby 22	Nakajima	95	0	?	?	Mitsubishi (2)	950 ea
Tess 11	Nakajima	85	0	?	?	Mitsubishi (2)	950 ea

[1] *Alf*, and *Val* (a dive bomber) seem to contradict code naming system, possibly due to fact they were named early in war.
[2] Float planes, hence male names.

Twenty Days on a Raft

A whale nosed the downed flyer's raft, a marlin nearly speared it, and the sharks followed it day after day.

Lieut. (jg)
GEORGE H. SMITH

MY FLIGHT took off from Guadalcanal at 1330 for a routine combat patrol over Rendova and Munda. We were flying Grumman *Wildcats*. Enroute to Munda we encountered a series of thunderheads that were so well developed we could neither go over nor under them. We were, however, able to circle the storm to the south and arrived on station one hour late.

Though our mission was combat patrol, we found it necessary to return almost immediately for we had barely enough gas to get us home by skirting the storm to the south as we had done coming in. We decided that it would be best to fly "on the water," following the coast of New Georgia as far as possible, then go on instruments. Flying through the clouds on instruments, we hoped to break out by the time we got to the Russell Islands.

My compass was not working, so my only hope was to fly wing on someone whose instruments were intact. Shortly after entering the clouds at the eastern end of New Georgia our formation dispersed and every man was on his own. It would have been foolish for me to continue on instruments with a compass I couldn't depend on, so I turned back to Rendova. I decided to try to go around the storm to the south and possibly get close to the Russell Islands before running out of fuel and facing a landing in the water. I followed that plan but the storm had moved farther south and when I came down in the water at 1900, I was between 50 and 70 miles south of the Russell Islands.

Landing a *Wildcat* on the ocean is like dropping a pebble on the water. The water slows it but it continues to sink. After the belly of my plane hit the water, the plane went forward 15 or 20 feet, then nosed down.

Fortunately I was prepared. I had the hood locked open and I had an extra canteen and an extra emergency kit on my parachute harness. My shoulder straps and safety belt were drawn as tight as I could get them. When the plane stopped its forward motion I disengaged the safety harness, kept my parachute buckled on me, gave a hard push with my legs and went about five feet up to the surface of the water.

My rubber raft was of the small, one-man, seat-pack type that is an integral part of the seat-type parachute. Once in the water it took about five minutes to unpack and inflate the raft. It was dark when I landed on the water but despite that fact I finally succeeded in removing and inflating the raft. I dumped my heavy, watersoaked parachute pack into the raft and painstakingly worked myself aboard, being careful all the while not to capsize the raft and run the risk of losing it in the dark. Completely exhausted, I lay athwartships for almost five minutes, vomiting up the seawater I had swallowed during the struggle in the water. When I was sufficiently rested, I worked myself farther into the raft and assumed the sitting position from which, but for few exceptions, I was not to stir for 20 days.

The night air blowing through my water-soaked clothes gave me a chill but I shivered for nearly two hours before I decided to unpack my parachute for use as a blanket. Once unpacked, the chute was so big and clumsy that there was not room in the raft for all of it. Therefore I cut off half the shroud lines and stowed them in the raft against possible future need and cut off the top half of the canopy to use as a blanket. The rest I tied in a bundle, secured to the raft with an eight-inch length of shroud line and, along with the pack and harness, threw it overboard.

By this time the moon was well above the horizon. It was a friendly, full moon, which I was destined to observe through one complete phase before it would finally disappear and leave me lost and lonely amidst endless black nights. I knew that ships no longer sailed the waters of the Coral Sea. I knew also that planes were not likely to be out there at night, so I decided to try to get a little sleep. Unable to lie down in the [illegible], I devised a method of sleeping in a sitting position. I tucked my parachute silk under my feet, pulled it back over my knees and over my head, then tucked it in behind me. The silk would then support my head, throwing the weight against my feet. Even with that device I was unable to get more than two or three hours of sleep each night. The waves and swells were consistently 10 to 20 feet high. As soon as I would doze off a wave would break over the boat and wake me up. Then I would bail out the water, doze again, another wave would break and so it went through the night.

The days were hot, the nights were cold and the wind and waves were merciless. To combat the heat of the day I kept my flight suit, helmet, shoes, sunglasses and even my gloves on. I made a parachute silk mask for my face. As a result I suffered [illegible]. My light brown hair turned yellow despite the [illegible] my helmet.

The wind and waves [illegible] more difficult problem [illegible]

(Continued on [illegible])

By FRED HAMLIN

Bulge Lessons

General von Rundstedt's historic drive into France has stirred up some tactical thinking which may be used to great advantage in mopping up Japan. At least that's what we hear from some of the crack AAF boys who were in France when the Bulge existed and who have come back to retail the lessons they learned to GHQ in Washington . . . Weather and necessity broke up the "packets of air power" theory that had dominated Western Front tactics for months, according to our informants. Later reinstated, it worked more efficiently because, in the meantime, red tape had been tossed out the window. . . . It happened like this: Cunningham was put in operational command of all the tactical air power north of the bulge when von Rundstedt began his drive. Packets were junked. There was complete and unified command from the Dutch coast to the center of the bulge. It was, in effect, the same deadly set-up that had existed prior to D-day. . . . Results were immediate and devastating. Methodical air attacks began without any waste of effort. *Typhoons* took one sector, *Thunderbolts* another. The mediums went to work covered by *Spits*. On one day alone the Ninth TAC destroyed or damaged more than 1,000 tanks, supporting General Arnold's long-standing contention that the air arm is equal to the combined land and naval arm. The Eighth Air Force and the RAF Bomber Command were integrated into a unit—and went to town. The bulge became a bad bump on von Rundstedt's head, if not a permanent military fracture.

For Future Reference

Men who flew in the Battle of the Bulge seem divided in their conclusions. On the one hand, a single command of the tactical air power is favored by most because it got such immediate and excellent results. Another group maintains that smaller commands of tactical air power can be successful, that this was proved after the back of the von Rundstedt drive was broken. . . . Perhaps the best summary is given in these words of a man who was in on the show: "In my mind the question is not whether we are using our air power effectively. The question is how *efficiently* are we using it? One of these problems is the efficient *operational* control of this vast air power." . . . He ended the discussion on a question: "When all of it eventually converges on Japan, who is going to run it?" . . . And here's another aside on the Battle of the Bulge that we hadn't heard before: The Germans moved in fast under cover of poor weather. Bases would open up for a few minutes and then the stratus would roll in again, with clouds right down to the deck. This went on for hour after hour, day after day, until nerves became raw. "If you can't get those censored-censored fighter-bombers into the air," roared one ground officer on the phone, "then for blank-blank grab a rifle and come on down here!" . . . And then? General Patton prayed for clear skies. They arrived the next morning, of course, and they *stayed* clear. . . .

Marine Mystery Squadron

Washington had a brief visit not long ago from Lieut. Col. Jack Cram, USMC, leader of the mysterious Marine squadron of *Mitchells* (PBJ's) which recently completed 74 nights of continuous attacks on Jap shipping and used a 500,000,000 candle-power "secret weapon." We looked Jack up before he returned to his command in Saipan. The colonel, a former ring-leader in the CAA-CPT program, joined the Marines well before they got into the war. His squadron's night attacks began on November 13 of last year. [He, himself, had torpedoed Jap transports in the darkest days of Guadalcanal —with a *Catalina*.] Cram & Co. returned from their first strike with two direct hits —one on a sub, one on a transport. . . . We asked Jack about the squadron's 500,000,000-candlepower photo-flash bomb, and he told us all he could. It's really nothing world-shaking, he said—just a big load of stuff that goes off in 1/5 of a second and blinds enemy ack-ack gunners on the decks of transports for 20 minutes, if not permanently. . . . The *Mitchells*, beginning a rocket run—they don't use bombs—soon found plenty of antiaircraft coming up at them and the flash bomb was rigged as a possible solution. It worked, and how! Ack-ack stopped the minute the bomb exploded, and never resumed. The light is so powerful that Cram's men have to duck their eyes out of the way. It has been seen as far away as 60 miles. . . . Cram's boys have had relatively light losses. During their 74-day raid they attacked a total of 49 ships and saw 29 fires or explosions. And rocket-hits below deck are not scored unless followed by a visible explosion of some form.

War of Wits

Cram said that the reason his boys have suffered so few casualties is, simply, experimentation. "You can't stay in the field and stay alive without constantly experimenting," he said. That's why he's not too enthusiastic about the flash bomb. It is swell as a surprise package for the enemy, but you can count on him to figure out a counter-weapon. The trick is to keep one jump ahead of him, offensively and defensively. That calls for a lot of variety, for tailor-made planning on every new type of raid, for constant study of the enemy and his tactics.

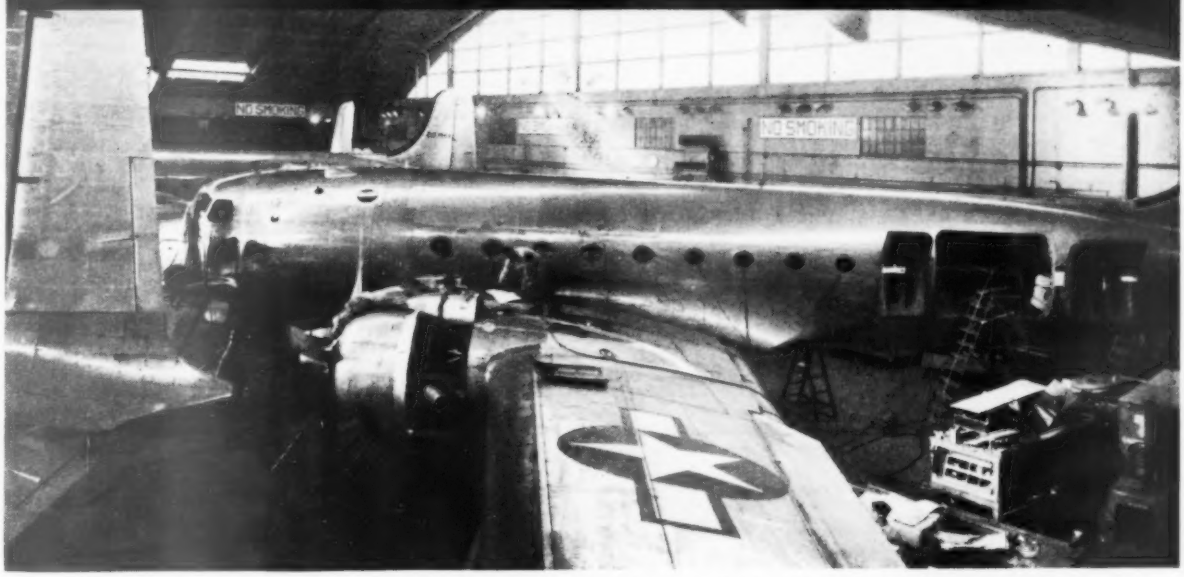
One evidence of constant tactical progress is that the U. S. Navy now admits privately that dive bombing is inferior to masthead or skip bombing, and that the technique of dive bombing as we now know it may gradually disappear . . . Don't think that the Jap is witless, either. On the contrary, he's coming up with new and better planes and tactics constantly. But occasionally the Jap does something that leaves you thinking he's an imbecile, like the night one of Cram's boys discovered a Jap plane on his wing. The Jap wasn't maneuvering for a shot—just going along, friendly-like, part of the formation. The *Mitchell* pilot maneuvered to shake the enemy and then returned to make a run on a Jap ship. Again the Jap plane appeared, and again the *Mitchell* evaded. This happened three times without a shot being fired and finally the American went ahead and made his run and got out of there. Only thing the squadron could figure afterwards was that the Jap pilot had instructions to tag along and see how the Yankees did their stuff.

Good Night, Sweet Prince

A veteran flyer of World War I, Jack (James H.) Knight tried desperately to become a fighter pilot in World War II, although he knew better than anyone else that he was a physical wreck. He didn't resent it when he was turned down. Instead, during the early days of this war he was constantly assuring those skeptical of air power that "We are going to have the finest army of flying talent in the history of the world." . . . Jack had a lot of firsts on his list. Neither snow nor rain nor heat nor gloom of night kept him from swift completion of the first through transcontinental day-and-night airmail flight in 1921. The flight was made in an elasped time of 33½ hours. Jack flew

(*Continued on page* 114)

'WAR-BABY' AIRLINE



In TWA's busy Hangar I at Washington National Airport, Skymasters are maintained between their globe-girdling flights.

Soon after Pearl Harbor, TWA's Intercontinental Division started out with a single Stratoliner. Last year ICD flew more than 13,000,000 miles.

THIS is the story of how an emergency airline, starting with a single plane, became one of the nation's most potent means of global transportation. It began less than three weeks after Pearl Harbor. Last year it flew more than 13,000,000 miles. In between it has sent its planes over the globe and has pioneered many innovations in world air transport. It is the story of the Intercontinental Division of TWA.

The Intercontinental Division, abbreviated "ICD," became a paper reality December 24, 1941, when TWA President Jack Frye signed the first civilian transport contract with the Army for emergency courier flights to anywhere.

TWA allocated its five *Stratoliners* to do the job—they were the only four-engined transport planes in domestic operation at the time. But first, modifications had to be made at Kansas City for the long-distance flights to come. Seven seats were removed forward in the cabin to make room for 1,000-gallon gasoline tanks. Added to the wing tank capacity of 1,750 gallons they increased the planes' range by 1,000 miles. An additional 250 pounds was saved by removing the cabin pressurizing equipment.

On February 24, 1942, the first modified *Stratoliner* took off for Washington. Aboard was an oversized crew (the extra men for training purposes), including Otis Bryan, pilot; Milo Campbell, Don Terry and W. L. Noftsinger, co-pilots; Peter Redpath, Guy Arnold and Air Force Lieut. Donald L. Marshall, navigators; W. R. Shook, radio operator, and R. L. Proctor, flight engineer. All are as im-

President Roosevelt was an ICD passenger. With him is Otis F. Bryan, TWA vice president, who piloted the president on his flight to Casablanca, French Morocco, in January, 1943.

Lockheed Constellation has just been assigned to ICD by the Air Transport Command. TWA will fly these planes post-war.

Harold F. Blackburn manages the Intercontinental Division.

Rebuilt and returned to civil flying from ATC service, the Stratoliners are refitted with Fortress wings, engines and landing gear, and their horizontal stabilizers moved back.

portant to this story as were the passengers, mostly TWA executives: Harold F. Blackburn, now head of the Intercontinental Division; and Clifford Mutchler, Larry Fritz, Bob Loomis, D. L. Mesker, J. H. Poole, Don Duensing, Royal Jordan, Sam Mead and Dr. R. Bretney Miller. They had been told that ICD would operate as a separate TWA division and that they would run it. They knew as much about what they were going to do as the crew knew about the plane—which was on its first long flight. Crew and passengers had orders to start a world-wide airline by themselves, with one airplane.

AAF Col. T. L. Mosely, to whom they reported, was busy trying to catch up with a war that had gotten badly out of hand at Pearl Harbor.

"I don't know much more about it than you do," one Army spokesman summed up. "We have had some flights over the South Atlantic route to Africa but our reports on them are either incomplete or not yet in. You've got a plane. You say you have the know-how. We are not even sure of the facilities at the airports marked on these maps—but here are the maps. Your first flight leaves Bolling Field tomorrow to Cairo with a load of Army Air Transport Command officers and the sooner they get where they're going the better. You're on your own."

The *Stratoliner* took off the following day at 12:30.

On February 26, 1945, TWA observed the third anniversary of this first overseas flight. Some 5,000 transatlantic flights had been completed—which, according to TWA officials, is a world record for an airline today. On June 1, *Constellations* will be added to the transocean runs for the first time.

A lot of hard work went into the months between. And a lot of flying. Before the end of 1942, with all the *Stratoliners* in action, mileage had piled up to 2,449,329. The 1943 total more than trebled that to reach 8,571,949. In 1944 the total was 13,661,689.

Early in the war these mileages accumulated over varied routes. Given a flight to England, a pilot could go via Greenland and Iceland if he preferred that route to the South American-African run. Scheduled routes were developed later.

Today terminals are at Washington National Airport, LaGuardia Field in New York; Prestwick, Scotland; Paris, France, and Casablanca. Other points include isolated Stephenville, Newfoundland; Meeks Field, Iceland; Goose Bay, Labrador; BW-1, an auxiliary in Greenland; the Azores and Bermuda. Stops at Accra, Gold Coast, Dakar, Senegal, Fortaleza, and Natal and Belem, Brazil; Georgetown, British Guiana; Puerto Rico and Miami were discontinued about a year ago.

Recently a new route-pattern was added designed to benefit by the winds over the North Atlantic, which makes all year two-way traffic possible, speeds up flights, saves gas, and cuts passenger air-sickness to the vanishing point. Capt. Howard E. Hall, ICD pilot with 15 years on TWA, and George Lucey and George Hafner, his navigators, who made 50 round trips in *Frigid Fanny*, a *Skymaster* "flying weather bureau," helped work the method out. Improved overall weather reports are a by-product of the program.

Planes now operate on schedules as exacting as any kept by domestic airlines. Printed copies are distributed on a highly restricted basis to Army officials. Round-the-clock, every-few-hours-on-the-hour service is scheduled, for instance, between Washington, New York, and Prestwick, Scotland.

C-54's, C-54A's and C-54B's have replaced the *Stratoliners*. For a time TWA also flew the cargo-carrying *Liberators* (C-87's), but later turned them back to the Army when difficulties were encountered maintaining diverse types of equipment.

(*Continued on page* 107)

In 1944

es accum-
en a flight
ia Green-
rred that
rican run.
d later.
ngton Na-
d in New
s, France,
s include
oundland;
y, Labra-
nland; the
at Accra,
Fortaleza,
orgetown,
nd Miami
ago.
ern was
he winds
makes all
peeds up
nger air-

with
back.

t. Capt.
15 years
d George
made 50
cymaster
work the
weather
program.
es as ex-
airlines.
a highly
Round-
the-hour
between
restwick,

nave re-
ne TWA
berators
back to
encoun-
f equip-

LOCKHEED CONSTI

Four air-cooled Wright Cyclones, 2,

WING SPAN: 123 feet
LENGTH: 95 ft. 1⅜ in.
HEIGHT: 18 ft. 8⅜ in.
TOP SPEED: 340 m.p.h.
CRUISING SPEED (65% power): 300 m.p.h.
LANDING SPEED: 80 m.p.h.

MAXIM
SERVIC
GROSS
EMPTY
MAXIM
CREW:

ELLATION

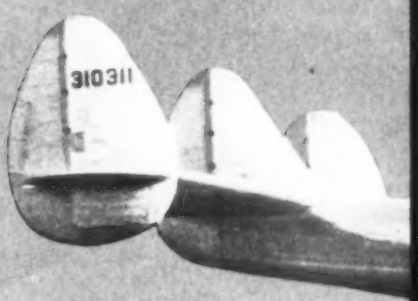
200 h.p. each

UM RANGE: 4,000 miles
E CEILING: 25,000 feet
WEIGHT: 86,250 pounds
WEIGHT: 55,550 pounds
UM PASSENGERS (day): 64
6

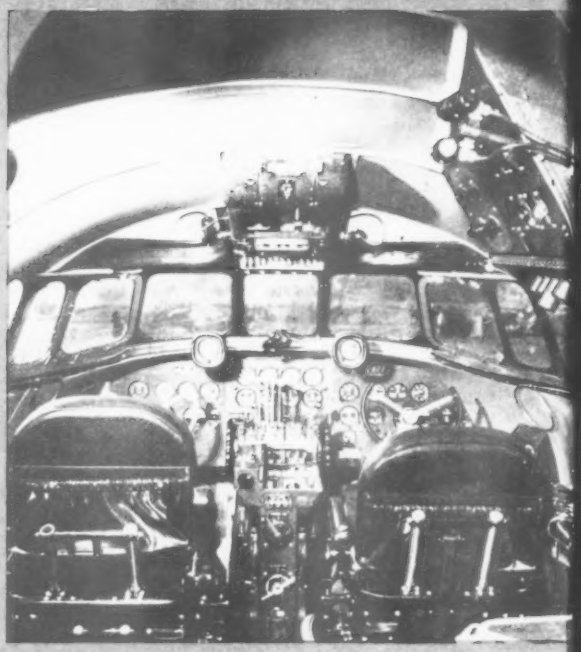
FLYING
CUTAWAY

© May, 1945

by
REYNOLD BROWN



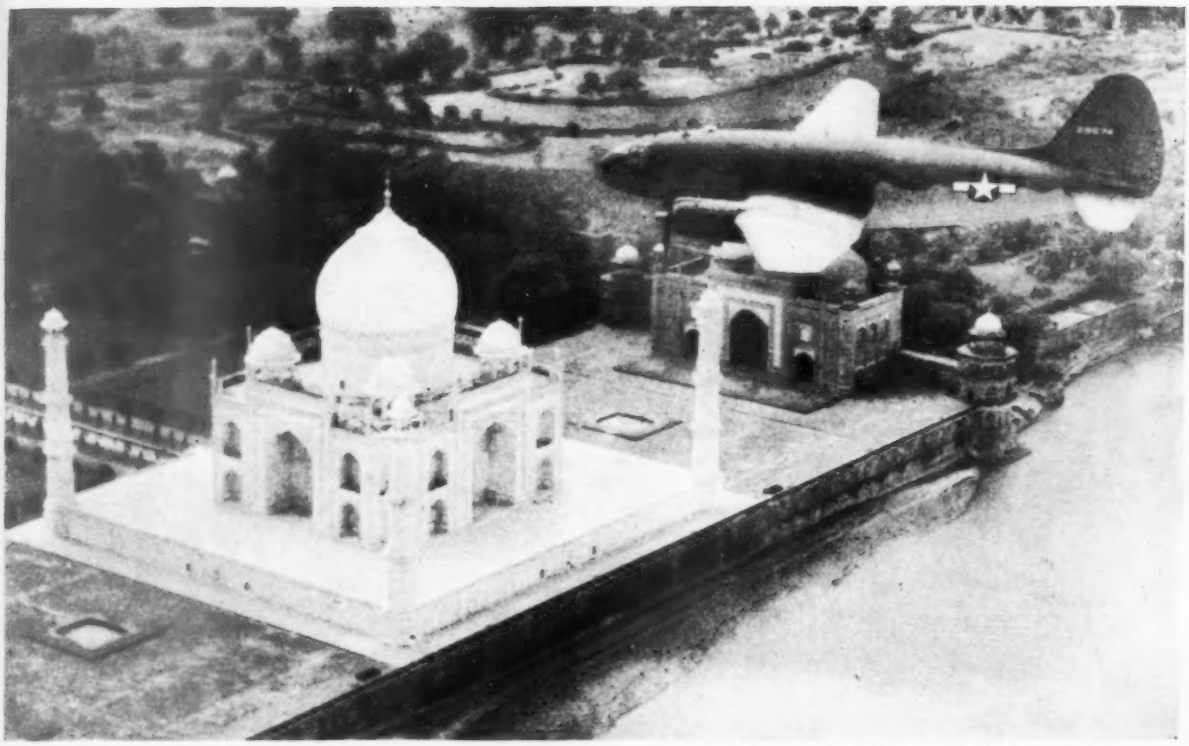
PRIMARILY an airline transport, the Constellation is the exclusive property of the Army Air Forces (as the C-69) for the duration. It probably will be used as an ambulance plane; the first Constellation recently was delivered to TWA's Intercontinental Divison (a military operation). FLYING's cutaway drawing is of the post-war airline transport; the photographs on this page are of the military version. The airliner will carry 48 passengers and 7,000 pounds of cargo from New York to Los Angeles in 8 hrs. 48 min., making one stop. Or it will carry 64 passengers and 2½ tons of cargo non-stop from Chicago to New York in 2 hrs. 48 min. New York-London will be about 12 hrs.



Constellation cockpit houses pilot, co-pilot, flight engineer and radio operator. Pilots' panel has only essential flight instruments.

neer and
truments.

Have You Seen?



An Army Air Forces ATC Curtiss Commando gives a modern touch to this aerial photograph of the famed Taj Mahal in India. The Commando, one of many shuttling supplies through the Burma-India theater, also is a standby for flying The Hump.

Experimental two-place Piper Skycoupe has 113-h.p. Franklin, range of 532 miles. Top speed is 110, span 30 feet, weight, 1,597 pounds.

Northrop XP-56, experimental AAF fighter, is flying wing with radial pusher engine and counter-props. It is still undergoing flight test.

Old U.S. Navy N3N-1 primary trainers have been turned over to civil flight schools. This one is at girls' Stephens College, Columbia, Mo.

Navy Coronado bombers have been converted to hospital planes, carrying 25 litters. It uses Jato and has new designation, PB2Y-5H.

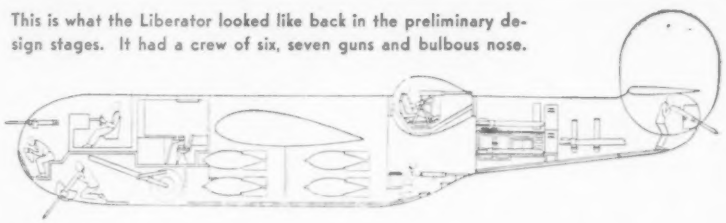
HAVE YOU SEEN?

CONTINUED

This P-38 has glass nose, bombsight, bombardier. It carries 4,000-pound bomb load.

Taylorcraft Model 15 is five-place post-war type in $4,000 class. Cruising speed with 125 h.p. is 112 m.p.h., stalling is 40. Range is 5½ hours, span 36 ft. 6 in. It still is classed as experimental.

This is what the Liberator looked like back in the preliminary design stages. It had a crew of six, seven guns and bulbous nose.



These are twin Jato units installed on each side of Mariner hull. They produce 300 h.p.

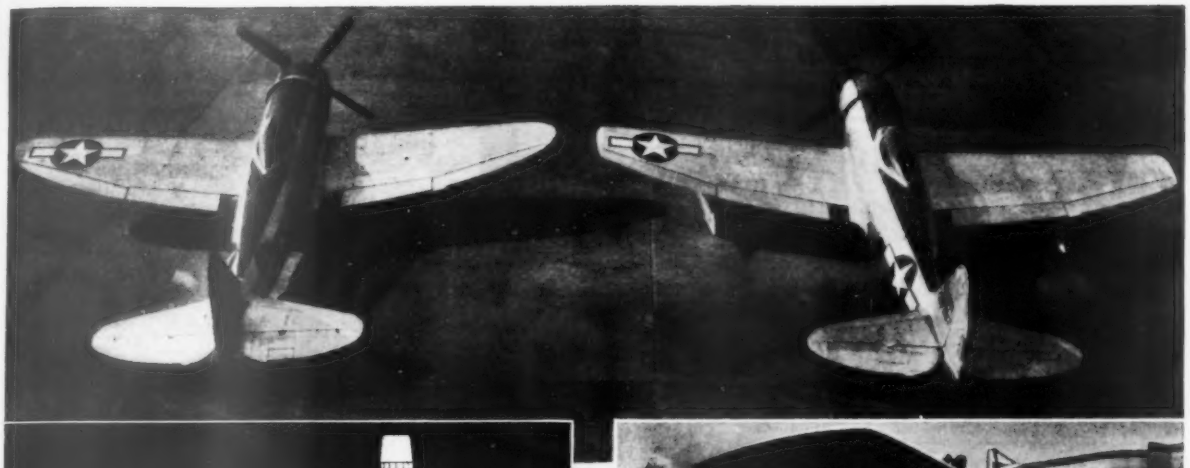
Another view of AAF's General Motors XP-75. It had eight .50-cal. guns, bomb racks, wide landing gear. The two three-blade counter-props were driven by engine behind cockpit, like Kingcobra.

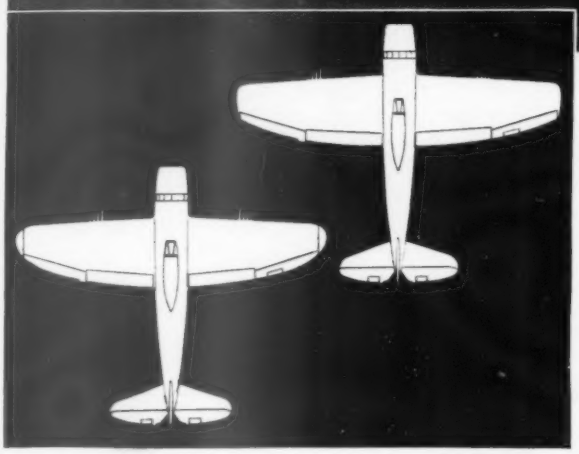
Experimental two-place Johnson Rocket has 185-h.p. engine, constant-speed prop, 2,200-pound gross. Range is 950 miles, span 30 ft. 10 in.

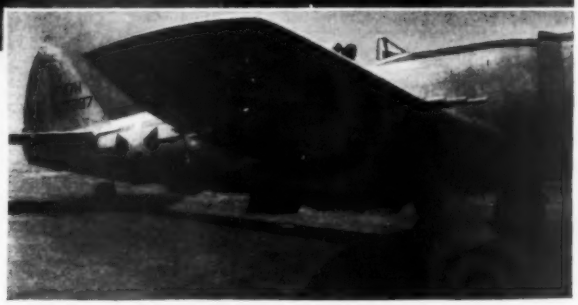
This Lightning was damaged during fighting over Leyte and the pilot crash-landed on a beach. Unusual point is pre-war AAF rudder stripes.

Captured Douglas DC-3 is being used on German airline between Portugal and Berlin. This photograph was taken on the airport at Lisbon.

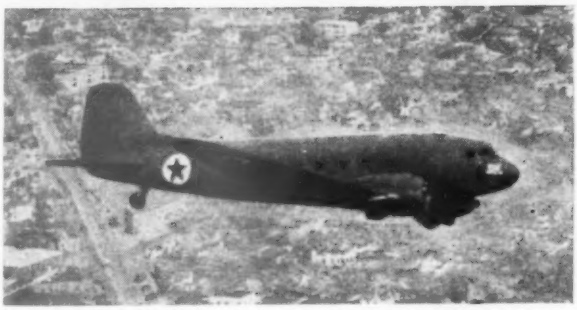
Two-place Call Model A is for high altitude fields, has 100-h.p. engine, top speed of 125, landing, 45. Gross weight: 1,550 pounds.







Latest Thunderbolt is the square-tipped P-47N, contrasted above with the P-47D. The "N" wing has 18 inches added span, 22 sq. ft. greater area. It is fastest Thunderbolt yet, has greatest combat range of any AAF fighter, probably will escort B-29's. Gross weight is over 20,000 pounds. Tire size and gear tread are increased, armament is the same.



This Douglas Skytrain, being test flown at the Douglas Oklahoma City factory, is one of several allocated to the Russians under Lend-Lease.

P-47M, special Thunderbolt used in European theater, has P-47D airframe, 2,100-h.p. engine which boosted its top speed over 450 m.p.h.

Stearman XBT-17 was experimental AAF trainer of 1940. Span was 35 ft. 9½ in., top speed 180 m.p.h., gross weight 2,810 pounds.

FOR IDENTIFICATION

1

2

3

4

5

6

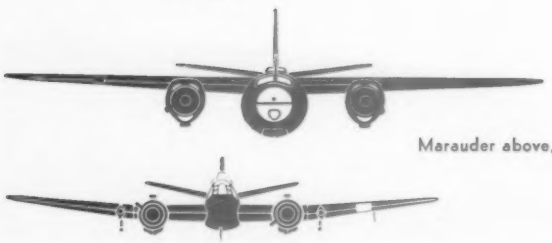
7

8

The planes are: 1. North American Texan (SNJ, AT-6); 2. Douglas DC-3 (C-47, R4D); 3. Supermarine Spitfire; 4. Boeing *Superfortress*; 5. Curtiss *Helldiver*; 6. North American *Mustang*; 7. Piper Cub; 8. Yak-3.

Marauder span: 71 ft. 3 in.

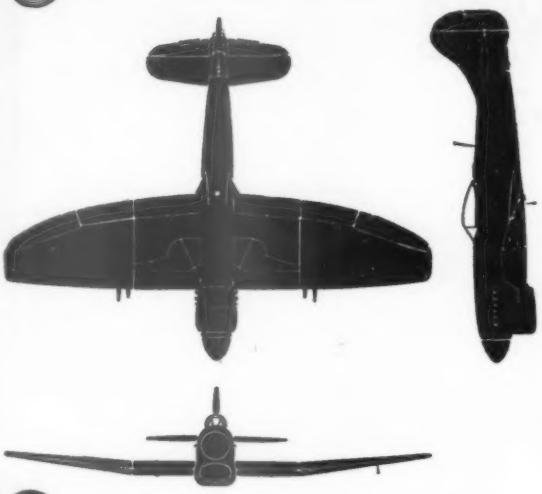
Beaufighter span: 57 ft. 10 in.

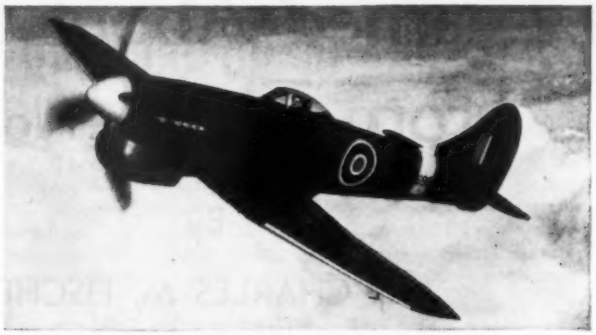


Marauder above, Beaufighter below.

MISTAKEN IDENTITIES

ALTHOUGH both are friendly aircraft, the Martin *Marauder* and Bristol *Beaufighter* both are used by the AAF and RAF and can be mistaken for each other. When studying their silhouettes, however, marked differences can be seen. Note the *Marauder's* long nose and jutting engine nacelles. The *Beaufighter* is a low-mid-wing monoplane, the *Marauder* is high-mid-wing. When seen to exact scale, as they are here, the *Marauder* is much larger.



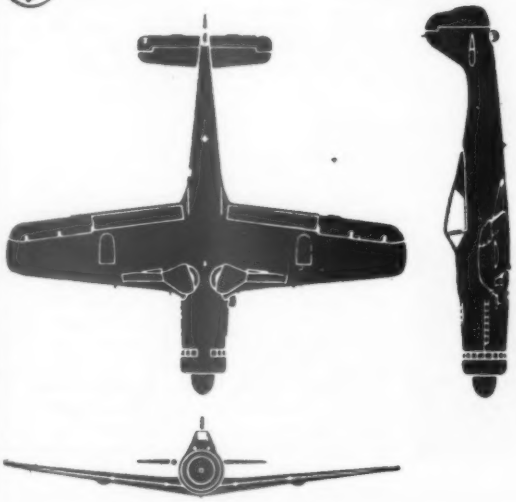


HAWKER TEMPEST V

Aside from certain British jet-propelled fighters, the Hawker *Tempest* is the best single-engined British fighter today. The *Tempest V*, shown here, is powered with a 2,400-h.p. liquid-cooled Napier *Sabre* engine. A British publication reported some time ago that there is a model of the *Tempest* powered with the air-cooled Bristol *Centaurus* engine. Span of the *Tempest V* is 41 feet, length, 33 ft. 8 in.; height, 16 ft. 1 in. Gross weight is 11,500 pounds, ceiling 36,000 feet, top speed 435.

JILL

Current Jap carrier-based torpedo bomber is this single-engined monoplane, reportedly produced by Nakajima to a 1942 design. The engine is a 1,500-h.p. Mitsubishi radial, which gives it a top speed of 329 m.p.h. at 19,500 feet. Wing span is 52 feet, length is 37 feet. Range is about 2,000 miles. The Jill is two-place and carries a single torpedo under the fuselage (see photo). Service ceiling is 35,400 feet.



FOCKE-WULF Fw-190D

Latest modification of this widely-used German fighter is the "D," powered with a liquid-cooled Junkers Jumo 213 engine of slightly under 2,000 h.p. It is reported that the airplane is essentially identical to earlier models of the Fw-190, except that the new engine increases the overall length to 33 ft. 11 in.; span remains 34 ft. 6 in. Armament is two 20-mm. cannon and two 13-mm. machine guns (about .50-cal.)

IDENTIFICATION NOTES

The RAF has designated the B-24J as the *Liberator* VI for Coastal Command use, equipped with a Leigh anti-sub searchlight. . . . The Boeing B-17G also is used by Coastal Command and is known as the *Fortress III*. . . . The recently announced Consolidated PBY-6A is that company's version of the Navy's *Catalina* modification known as the PBN. . . . The DeHavilland *Tiger Moth* has been designated the PT-24 by the AAF . . .

I Learned About Flying From That!—No. 67

By

Maj. CHARLES M. FISCHER
Chief Test Pilot, ATSC, San Bernardino, (Calif.) Army Air Field

A forgotten control lock taught this pilot that safety depends on the "double-check" technique.

THE wind blew gustily around the corner of the huge flight-test hangar—wind that was to cause me to make an almost fatal mistake. Some of the boys were delivering overhauled *Lightnings* to a training base at Moses Lake, Wash. I was to follow along and ferry the pilots back in an old Douglas *Dragon* (B-23) bomber.

"All ready to go, Dick?" I asked my civilian crew chief.

"Yes sir. She's full of gas and I've checked her over thoroughly."

He slammed the cabin door and trailed me up through the long fuselage into the pilot's cockpit.

After starting the engines we taxied out to the end of the runway to the engine run-up position. Meanwhile, the wind exerted a tremendous pressure against the unusually large rudder and I had difficulty holding it in position. My leg muscles began to ache.

I checked the engines carefully, watching each instrument closely as it told its important story. Everything seemed okay.

Flight controls jumped around under my hands and feet more than ever as the propeller blasts churned up the already turbulent air. Always careful about checking against locked controls, I proceeded to test them. My aching leg muscles told me the rudder was free. I looked out at the aileron on my side of the *Dragon* and twisted the wheel left. The control surface rose and then fell as I returned the wheel to neutral. Pulling back, I could feel the wind resisting my effort and concluded the control was free. I should have remembered that, because of the great length of the fuselage, there was a bit of "give" or stretch to the cables and pulleys, but this only added false assurance that everything was all right. It is the responsibility of the crew chief to remove the control locks before getting into the plane, so I thought no more about it.

We received permission from the San Bernardino control tower to take off, and were warned of "wind 25 to 30 with gusts."

Turning into the runway, which headed northwest toward the mountains, I advanced the throttles.

The heavy plane slowly gained speed until about half way down the runway it suddenly lifted into the air. It surprised me. I pushed forward on the wheel to level off and discovered I couldn't budge it. In consternation I turned to the crew chief.

"Something is wrong with the elevators. I can't move them. Did you remove the control locks?" I heaved violently on the wheel but, except for the spring in the cables, I could get absolutely no reaction.

"Yes sir. I took them off," Dick shouted back at me.

"Are you sure?"

"Positive," he affirmed.

We were now about 20 feet in the air and climbing. I didn't know what to do. I wanted desperately to be back on the ground—so I could start all over again.

I snapped the throttles closed. The heavy plane fell like a rock—and bounced. Ahead of us was the fence and a large concrete drainage ditch. I could picture us rolling into it and nosing over—probably smashing the gas tanks and catching on fire.

I pushed the throttles open again, catching the plane just before it settled to the ground. We managed to clear the fence.

It was a snap decision and, win or lose, I was stuck with it. I soon discovered that by reducing the power, or increasing it, I could climb or descend. The sensation was something like that of trying to balance yourself in a rocking chair on top of a fence. I felt uncomfortably warm, unloosened my tie with a jerk of my fingers.

At 1,000 feet altitude I pulled back the throttles until we maintained level flight.

My co-pilot, Lieutenant Galloway, looked at me, his eyes bright in the white pallor of his face.

"Shall I pull the gear up?"

"Hell, no!" I exclaimed quickly. "It will upset the balance of the plane. We're doing all right now; don't let's spoil it."

I radioed the control tower and informed them of our plight, told them we would try to land on the same runway.

I was apprehensive about the rough air. One bad bump causing the nose to go up or down excessively might cause us to lose control. I toyed with the idea of bailing out, and discarded it. I felt con-

(*Continued on page* 144)

Major Fischer holds removal cord of elevator control lock—painted with stripes to aid in identification. Failure of ground crewman to remove lock almost caused washout of plane.

"My Son has me up in the Air!"

1 **It seems** that my boy in the Air Force has written to the Aeronca people, and he really has me up in the air. He tells me some fascinating things about the personal planes this company will have postwar. He talks about them as he would about a new car . . . big, comfortable lounge-type seats in one model, wing slots in another, and a type big enough for the family at a modest price.

2 **He says** that because Aeronca is 100% on war work now, they've learned as much these last couple of years as they did in more than 16 years of previous experience. They've won the Army and Navy "E" (the only light aircraft company to receive this award). All told, the story sounds like good news for air-minded people. When I write my son about it, he just answers:

3 **"Get on the beam,** Pop! Send for a couple of the booklets these Aeronca people have. One tells about their new personal planes. Another describes their plans for airfields and servicing of planes near home." It sounds as though they're putting personal planes in a class with automobiles. I'm following my boy's advice and sending for the booklets. Why don't you?

AMERICA'S PERSONAL PLANE

AERONCA

has an important message for air-minded people

Aeronca Aircraft Corporation, Middletown, Ohio
Department F-5

Send me your valuable booklets. Enclosed is 10c for each booklet.
(Check)

_____"Aeronca—the Plane You'll Want to Fly"
_____"How to Make Small Airports Pay with Aeronca"

Name_____

Address_____

City and State_____

Export Agency—Aviquipo, Inc., 25 Beaver Street, New York, N. Y.

Letters

TURF SPECIALIST

Sirs:

Joan David's "Let Your Airport Go to Grass" was a good general article on this subject. The writer served approximately for 1½ years as senior agronomist, turf specialist, with the U. S. Engineers in the South Atlantic division and believes turf has a definite place in aviation and should be considered for at least two important jobs—dust and erosion control and use as a wearing surface. Under proper planting supervision and maintenance it will prove its excellence and economy.

A. L. BRANDON, EDITOR
The Greenskeepers' Reporter
St. Charles, Ill.

POST-WAR PLANNER

Sirs:

Your articles and discussions on post-war flying are of interest to everyone and are the only ones I've read where the author was really in a position to speak authoritatively. I am particularly interested in the things in store for the peacetime aeronautical engineer. Your magazine has had a great influence on my plans after being mustered out of service.

PVT. CHAS. SCHOENBERG
European Theater of Operations.

WHICH IS SAFEST?

Sirs:

No cartoon published in recent months has caused as much hilarity as the letter, "Hail, The ATC" by F/O J. B. Bush appearing in your February issue.

It is a well-known fact among service personnel that the safest ATC ride is that provided by the ATC civilian contract carriers.

We in military aviation, who are seriously interested in post-war airline jobs, sincerely hope that the industry will not frown upon all of us as a result of the mouthings of a few obviously ill-informed "hot pilots."

CAPT. ROBERT W. SEEBERS, USMCR
Pacific Theater

RECALLING A RECORD

Sirs:

In FLYING's February issue, I noticed in "You Will Fly the High Road," a paragraph about two Air Corps officers who ascended to 72,935 feet in a special balloon gondola. Can you tell me who the officers were and when and where this took place?

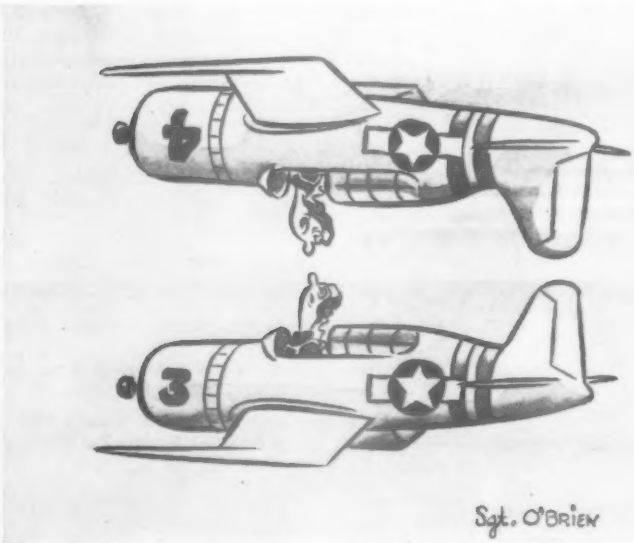
R. J. WATSON
Troy, N. Y.

● The record flight referred to occurred on November 11, 1935, from a point 11 miles southwest of Rapid City, S. D. The officers were Capt. A. W. Stevens (now colonel, retired) and Capt. O. A. Anderson (now brigadier general). The actual height was 72,394.795 feet, not 72,935. The balloon, *Explorer II*, still holds the world's absolute altitude record for any form of life-bearing aircraft.—ED.

MORE PRIVATE FLYING

Sirs:

Congratulations on the February issue of FLYING. The swell cover expresses the wishes of thousands of air-minded people—the desire for a private plane and some beautiful countryside to fly over.



FLYING "Well, one of us is wrong!"

I also enjoy your "I Learned About Flying From That" articles. From these experiences, private pilots everywhere gain valuable information from those who have truly learned "the hard way."

I hope you will continue to publish more on private flying—it really takes one back to the good old days.

C. ROBERT SIMMONS
Sackville, N. B., Canada.

SERVICE PILOT COMPLAINS

Sirs:

It is my opinion that Army and Navy lightplanes should not be sold as surplus to anyone until fellows with post-war plans who are now overseas fighting can get a chance to come back and buy some of the choice ones. I also believe Navy and Army pilots should be given a chance to buy at a low fixed price.

Like many civilians back home, we would like to get into various aviation businesses later on and want an equal chance to find a future. We all hope that something in the form of protection will be provided us so that all the options on select airports and feeder line locations won't be gobbled up by the vultures taking all the gravy now back in the U. S. We pilots out here are looking to you to see if a little justice can be done.

NAVY PILOT
Pacific Theater

● For the answer to this and similar letters from servicemen, FLYING called on Congressman Carter Manasco, member of the Surplus Property Disposal committee and responsible for the House of Representatives Report No. 1890 on this subject. Here's what he has to say:

"I have just previewed excerpts from a letter written by a Navy pilot now on active duty on an aircraft carrier in the Pacific.

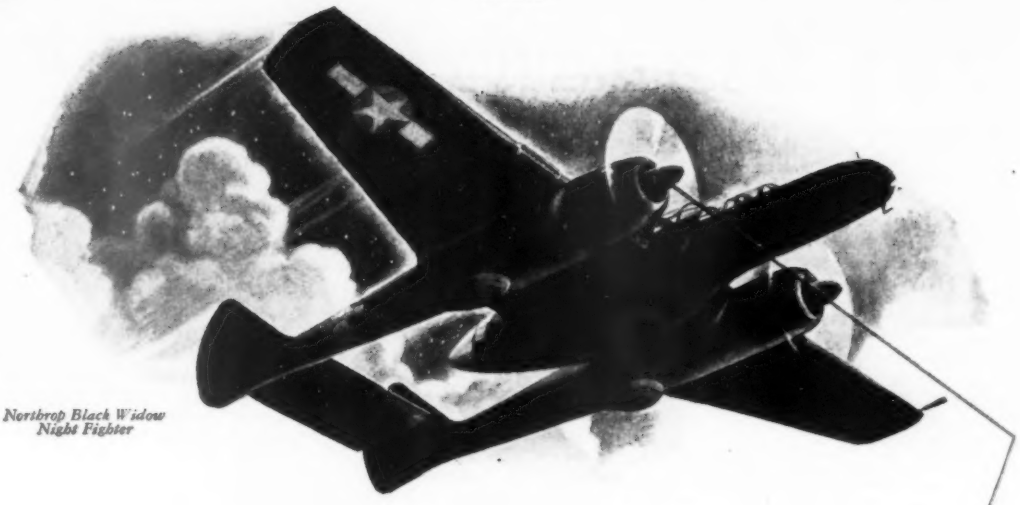
"It is necessary to move surplus aircraft as rapidly as possible for many reasons. In the first place, we do not have storage facilities to protect the airplanes. In the second place, we have a serious shortage of manpower and if we undertook to keep the surplus planes in flying condition thousands of man-hours would be lost, to the impairment of our war effort.

"The engines that come off the assembly lines today are obsolete before they are attached to the plane. For the security of our country we cannot afford a repetition of the Liberty engine episode which followed the last war, when over 17,000 such engines were declared surplus by the War Department. These engines powered military aircraft as late as 1930, retarding research and improvement in power plants. If the aviation industry is permitted to expand during peacetime without fear of indiscriminate dumping of aircraft and parts, the boys in service today will be able to purchase a new and more efficient plane in the post-war period, for a lower price than surplus aircraft are bringing today.

"If the industry is allowed to develop, the returning veteran also will have a better opportunity of securing peacetime employment.

"Of course, there will be vultures who

(*Continued on page* 147)



Northrop Black Widow Night Fighter

PRESTIGE ESTABLISHED IN THOUSANDS OF COMBAT MISSIONS!

Champion Ceramic Aircraft Spark Plugs are setting outstanding records for performance and dependability in the service of our air forces—from pilot training through to ultimate combat missions. That's why Champions have been supplied in ever increasing quantities to the air forces for four years past. Leading air line operators have likewise increased their demand for Champions because of their outstanding efficiency, economy and dependability. This prestige established in gruelling wartime service is a guarantee of Champion's continuing better performance and dependability after Victory. Use Champions and Fly with Confidence. Champion Spark Plug Company, Toledo 1, Ohio.

CHAMPION SPARK PLUGS

Buy More and More War Bonds Until the Day of Victory

C26 Unshielded

C34S Shielded

THE LIBRARY

CARRIER WAR by Lieut. Oliver Jensen, USNR; published by Pocket Books, Inc., 1230 Sixth Ave., New York, 1945. 184 pages. Price 50c for the paper-bound edition.

OUR FLYING NAVY, Training Literature Section of the Office of Deputy Chief of Naval Operations (Air); published by The Macmillan Company, 60 Fifth Ave., New York, in 1944. 187 pages. Price $3.75.

To the reader seeking facts, figures and an insight into what U. S. Naval aviation really can do and does, *Carrier War* is by far the better of these two books. This well done volume is the work of a seasoned reporter, now in Navy uniform. Lieutenant Jensen has written his adventure-packed history of Task Force 58, with so much attention to the small but important detail, that the reader's imagination has little difficulty in flying through an entire strike in either fighter, torpedo bomber or dive bomber—or all three in turn. Before finishing this book the reader is on intimate terms with the operation of a task force, knows friendly and enemy aircraft by their first names, and has documentary proof of the fact that our Naval aviation is giving Hon. Enemy unadulterated hell. The 200 photographs and maps are worth the price alone. *Carrier War* is to books what *The Fighting Lady* is to motion pictures.

"Our Flying Navy" might satisfy the brush and palette enthusiast. But for the busy, information-seeking reader, this book would hardly be worth the sales tax on its rather high price. Main purpose of *Our Flying Navy* is to put between covers a collection of paintings and sketches by seven able artists who spent a considerable amount of time visiting Naval aviation afloat and ashore. The collection of their works is owned by Abbott Laboratories, a pharmaceutical company at North Chicago, Ill. But to the practical, critical eye, the Abbott collection suffers considerably from almost unbeatable competition: the stark reality, incomparable beauty, minutely accurate work of the color camera. The text of *Our Flying Navy* deals broadly with the history of Naval aviation, but is confined to generalities and some inaccuracies; there is a reference on page 89 to a "Curtiss Hellcat." There is no information in it that the average air-minded reader does not already know.

MAX KARANT

THE AERONAUTICAL DICTIONARY, by Thomas A. Dickinson; published by Thomas Y. Crowell Company, 432 Fourth Ave., New York, in 1945. 484 pages. Price, $3.50.

Many aeronautical glossories on the market today are incomplete, lacking in explanatory detail. *The Aeronautical Dictionary* sets out to rectify this fault—with more than 6,000 aviation terms being defined clearly in simple language and with the use of more than 300 illustrations.

An example of thoroughness is the item "oil can," taken at random. The definition is: "A metal container used in dispensing oils. Or, in a colloquial sense, a bulge in sheet metal caused by the improper spacing of rivets on a structure. The latter condition is most undesirable in aircraft work, and can be detected simply by pressing on the surface of the metal in question; for the bulge will move back and forth like the bottom of an ordinary oil can."

Of particular interest to aviation executives, workers, flyers, technicians, and others, is the complete appendix. This covers abbreviations, aircraft recognition marks, chemical elements and symbols, aeronautical symbols, temperature equivalents, decimal equivalents of fractions, rules relative to the circle, conversion factors, weather symbols, table for solving right-angled triangles, systems of measurement, weights and gravities, functions of numbers, Army and Navy aircraft specifications, and many other valuable tables, charts and aeronautical information.

GAITHER LITTRELL

FLYING

"But you might at least try!"

SHORT VIEWS

AIRCRAFT VIBRATION AND FLUTTER, by C. R. Freberg and E. N. Kemler; published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, in 1944. 214 pages. Price $3.

An attempt to explain in non-technical language—and with a minimum of mathematics—the fundamentals and general phases of vibration and flutter affecting both stationary- and rotating-wing airplane structures and their parts.

THE PHYSICS OF FLIGHT, by Alfred Lande; published by the Reinhold Publishing Corporation, 330 W. 42nd Street, New York, in 1945. 122 pages. Price $2.50.

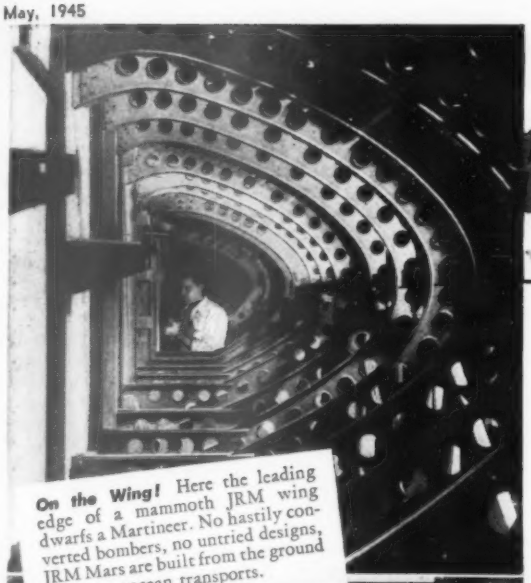
Basic mathematic principles involved in flight trimmed of "the non-essentials which make most textbooks on the subject bulky and unreadable." Suffering a little from over-condensation, the material it does contain is generously illustrated with sketches, diagrams and halftones.

AIRCRAFT MECHANICAL DRAWING, by D. J. Davis and C. H. Goen; published by McGraw-Hill Book Company, 330 W. 42nd Street, New York, in 1944. 245 pages. Price $2.50.

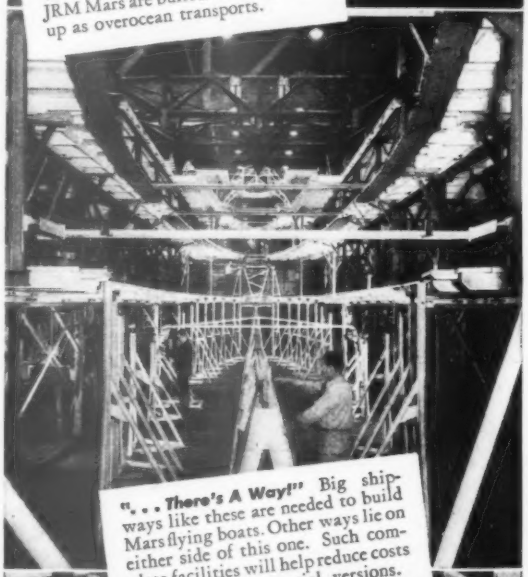
An aircraft handbook for the student who has had no previous instruction in mechanical drawing. Its progressive lessons on standard aircraft and mechanical drawing practices do require a basic knowledge of mathematics.

NOTES ON HELICOPTER DESIGN THEORY, by Alexander A. Nikolsky; published by the Princeton University Press, Princeton, N. J., in 1944. 228 pages. Price $3.

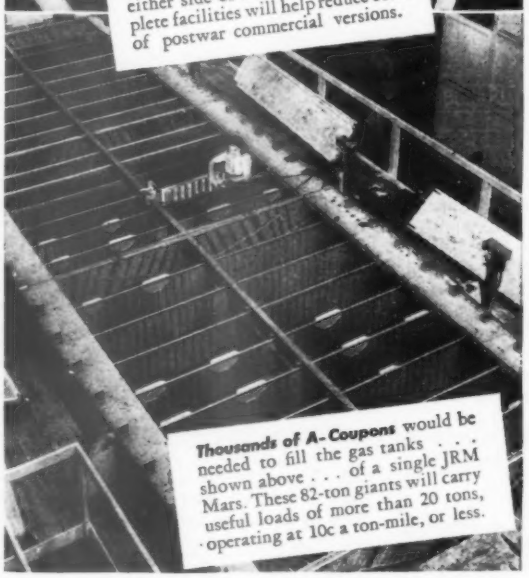
Notes on helicopter design prepared for use in a special four-weeks' course presented to a group of engineers representing the U. S. Army Air Forces, the U. S. Navy Bureau of Aeronautics, and a number of aircraft manufacturers. Highly technical, the book does not constitute a textbook but is a valuable collection of helicopter data. END



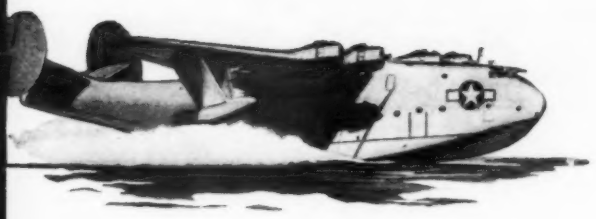
On the Wing! Here the leading edge of a mammoth JRM wing dwarfs a Martineer. No hastily converted bombers, no untried designs, JRM Mars are built from the ground up as overocean transports.



"... There's A Way!" Big shipways like these are needed to build Mars flying boats. Other ways lie on either side of this one. Such complete facilities will help reduce costs of postwar commercial versions.



Thousands of A-Coupons would be needed to fill the gas tanks . . . shown above . . . of a single JRM Mars. These 82-ton giants will carry useful loads of more than 20 tons, operating at 10c a ton-mile, or less.



Tooled and equipped for prompt delivery of

MARTIN MARS AIRLINERS!

IN a year of service with the Navy the Martin Mars has demonstrated convincingly her outstanding performance characteristics. She's carried useful loads of over 35,000 lbs.—flown non-stop 4,227 miles—operated, under war conditions, at 15c per ton-mile. But sensational as her performance has been, there's another and equally important fact that recommends Mars-type transports to overocean airline operators.

Prompt Postwar Delivery

Airlines ordering commercial versions of the Mars, when Victory finally comes, will have no long wait for designing, tooling, testing and ironing out "bugs." Martin assembly lines are fully tooled *today*, for production of 20 more Mars transports for the Navy. Moreover, a year's service has thoroughly tested the Mars, yielding developments which are being incorporated in her 20 sisterships. Result: prompt delivery of Mars transports, which will permit airlines ordering these planes to "get the jump" on competition.

THE GLENN L. MARTIN CO., BALTIMORE 3, MD.
GLENN L. MARTIN-NEBRASKA COMPANY—OMAHA

Martin
AIRCRAFT

Builders of Dependable Aircraft Since 1909

AOPA NEWS

The Aircraft Owners and Pilots Association (AOPA), with National Headquarters Office located in the Carpenters Bldg., Washington 1, D. C., is a non-profit organization composed exclusively of pilots. It looks after the pilot's best interests in all phases of aviation and helps individual pilots with their individual problems. The AOPA operates with a full-time professional staff and is the largest group of civilian pilots in the world. This column is edited by the Aircraft Owners and Pilots Association and opinions contained in it are not necessarily those of FLYING. A special bulletin is sent each month to all registered AOPA pilots and also confidential newsletters from AOPA's Washington staff are sent members from time to time.

OLDER PILOTS SAFEST

Flying is *not* a young man's game. This is the conclusion drawn from a recent survey of accidents involving non-scheduled civilian pilots. Reports show that the best safety record is within the 30-45 year age group and that the poorest record belongs to the age range of 18-25.

These findings explode the popular belief that the safest flying is done by youth. Another interesting revelation is that older persons usually require a longer period of dual instruction prior to solo than younger pilots. From this fact the question naturally arises as to why the younger, "quick-learning" pilot ultimately has a higher accident ratio than the older, "slow-learning" pilot.

The answer, according to the records, seems to be summed up in two words: mature judgment. There is less careless flying and "show-off" acrobatic maneuvers among the older pilots. Among the younger groups there is less evidence of careful flight planning, aircraft inspection, and employment of "horse sense."

Pursuing this study further, AOPA has found that more mature plane owners are consistently better risks than younger aircraft owners. This trend is very evident even among AOPA members. Records show conclusively that the older pilots more frequently call upon AOPA for information regarding proposed cross-country trips and maintenance tips for their aircraft and engines. On the other hand, a majority of requests for legal assistance pertaining to aircraft accidents or alleged violations of air-traffic rules come from younger pilots.

In the light of this, we repeat again, "the oldest pilots are not the boldest pilots."

PRIVATE PLANES AND THE VHF PROGRAM

CAA has announced its intention of installing very high frequency (VHF) radio aids along several new air routes and simultaneously has adopted a policy of discouraging further installation of low-frequency radio range stations. AOPA has previously informed its members regarding the relative merits of these two types of radio navigation facilities. These discussions have not pointed out the relationship between VHF-equipped airways and the personal airplane. There is an important significance which AOPA pilots should know and which is related directly to their pocketbooks.

Present radio-range stations operate on frequencies falling within the 200-400 kc. band. The standard aircraft receivers which most private pilots use are built to receive only the 200-400-kc. radio range transmission. These receivers are not built nor can they be easily adapted to receive the new VHF radio navigational broadcasts. This means that private pilots will have to buy and install an additional radio receiver if they are to make use of new VHF stations.

The conversion of airway radio aids from the low-powered range station to VHF equipment will be gradual if present plans are carried out, but cross-country flying necessitating radio aids will soon require a pilot to have *both* types of receivers if he is to make full use of the facilities. In addition, if instrument flying is to be conducted and fan markers are to be utilized in connection with instrument let-down procedures, a third radio receiver or "marker beacon receiver" will be essential.

Add to this array of radio equipment the problem of a transmitter (required for instrument flying), and the total cost of radio equipment for the private airplane approximates one-half the cost of a Piper *Cub*. And we have not considered the expensive equipment which will be required to utilize the low-approach, or "blind landing" facilities which CAA is presently installing at numerous airport sites. These landing systems, although primarily used at present by military and air-carrier aircraft, apparently will become standard for postwar itinerant aircraft use. Nor have we considered the installation of direction finding, or ADF, radio equipment which permits aircraft flights to proceed point-to-point between radio stations without meandering along the irregular routes of many civil airways served by the connecting legs of low-powered radio range stations.

Based on past experience it seems only a matter of time until the Civil Aeronautics Board will promulgate new and additional regulations prohibiting aircraft from navigating along routes or airways unless equipped with a large portion, if not all, of the foregoing radio equipment. Where will this put the private flyer?

The normal pilot reaction is merely to shrug and say, "So what, we will fly off airways." But this is not the answer because the CAA also intends to designate many hundreds of miles of new airways in the near future.

The CAA Administrator recently announced a policy which will require all air-carrier aircraft to fly on routes over which civil airways have been designated, and to prohibit air-carrier aircraft from flying solely on ADF bearings between points not connected by designated airways. If this policy prevails, additional thousands of square miles of air space will be "controlled" by the CAA and denied to private aircraft owners who are unable to equip their aircraft with the radio gadgets required under marginal and instrument weather conditions.

AOPA is asking CAA officials to announce in advance what specific burdens are contemplated on non-scheduled aircraft owners under this new development program and what regulations will follow as a result. It is our opinion that VHF radio ranges are far from proven, in their present stage of development, and that more careful and extensive tests should be conducted before the taxpayer's money is expended and these complications and burdens are imposed on the non-scheduled flyer. It is our contention that the initial experimental airway implemented by VHF equipment has not provided sufficient nor conclusive operational data which would justify the presently proposed program of VHF installations. AOPA is greatly influenced in rendering this opinion by the other radio developments known to be currently in use by the military, both within the United States and in foreign theaters of operation.

Many of these later developments of the military are reported to be of greatly simplified design and, if adopted, should result in a less expensive and more efficient radio installation for private aircraft. Rather than to rush into a "fool's paradise" with unproven and expensive VHF equipment, AOPA urges Government authorities to defer this elaborate program until the war's end, when the cloak of military secrecy can be removed from these newer radio navigational aids and their peacetime civil aviation application can be given thorough study and evaluation. END

VOX PILOT

"I am continuously impressed by the activities of the AOPA and the goals which it works for and achieves," writes Robert W. Barnhill, AOPA 6945.

"I am glad that we have the AOPA to look after our interests while we are in the Army. I know that, when this is over, we will have AOPA to thank for the fact that we can again take to the air without a million restrictions and regulations. I realize more and more the growing power of our organization and the futility of each of us as individuals; therefore I want to assure you that each of us is behind you 100 per cent and I look forward to a continued good fight on your part in our behalf," writes Pvt. Walton P. Maas, AOPA 7767.

"It's the best five bucks' worth I ever got in my life when I joined AOPA," says Creston Laager, AOPA 8622.

. . . draw the line AND *FLY IT!*

WITH THE Sperry Gyrosyn Compass you can do just that! It gives dead-beat indications . . . accurate magnetic headings . . . is without northerly turning error, oscillation or swinging. And it does *not* require resetting.

This flight and navigation instrument is a Directional *Gyro syn*chronized with the earth's magnetic field, providing stable indication under all conditions of air turbulence. Write our Aeronautical Department for information.

SPERRY GYROSCOPE COMPANY, INC. GREAT NECK, N. Y.

Division of the Sperry Corporation

★

LOS ANGELES • SAN FRANCISCO • NEW ORLEANS
HONOLULU • CLEVELAND • SEATTLE

GYROSCOPICS • ELECTRONICS • RADAR • AUTOMATIC COMPUTATION • SERVO-MECHANISMS

Army Air Forces Report

(*Continued from page 27*)

equipment exposed to the elements under masses of twisted beams and metal. Because many of the bombs dropped by the AAF had delayed fuses, they came down inside before exploding and dislodging building foundations, the bases for the light and heavy machines, and the machines themselves. Power lines, water systems, pipes, power drives were destroyed. Those machines which were damaged but not destroyed had to be painstakingly tested before they could be rebuilt. After the AAF and RAF bombings, the Germans put huge salvage crews to work in the sheet-metal and radiator shops, the casting foundry, forges, airplane engine and assembly shops, chemical products section, and other units.

But despite the vast effort and the German engineering skill brought to bear, Renault was never thereafter able to employ more than 12,000 workmen, one-third of its normal complement. Damage to the Renault plant had other repercussions. Each of the first two attacks blew out 30 acres of windows. The output of a glass factory was requisitioned for replacement. Steel was needed, also brick, cement, copper wire, and electrical appliances. Precision parts were needed for damaged machines. When the Germans could not replace destroyed machinery, one lathe or gear cutter or drill press was required to do the work of two, creating a bottleneck.

And the bombing caused Germany to reap a secondary effect, the penalties of slave labor. Shortages and poor workmanship and sabotage could be conveniently explained as the result of bomb damage. It was a blanket excuse for an organized slowdown by the French workmen.

Dispersal of industry, planned as a defense against strategic bombing, ran into the complication of our attack on transport. After bombing of the Hispano-Suiza plant at Bois Colombes had ruined the foundry, all castings had to be shipped from a foundry in the Pyrenees, subject to all the vicissitudes affecting the transport system. When the Germans fled they left behind rows of aircraft engines in the Bois Colombes factory—boxed and ready for shipment but with no transport to get them delivered to the hard-pressed German *Luftwaffe*.

The V-1 robot bomb storage depot near Isle-Adam was made as bombproof as surface installations could be constructed. Buildings were low, with thick brick walls and reinforced concrete roofs. Sloping earth embankments held by wickerwork were built around each structure up to the flat concrete roofs. Buildings were spaced from 100 to 200 yards apart, dispersed over an area of three square kilometers, with a little railroad connecting them. The whole thing was camouflaged.

AAF and RAF heavies began hammering it. After the 8th Air Force assault of August 5 it was put out of commission. Hardly a square yard of earth in the whole area was undisturbed.

In April, the 15th Air Force attacked the Ploesti refineries in Romania in considerable force. On May 12 the 8th Air Force made its first large-scale bombardment of synthetic production in Germany. From May through September the 8th Air Force made six major attacks on 32 plants and refineries. The 15th Air Force bombed 41 oil plants and refineries. RAF Bomber Command made night and day attacks on oil.

We know that because of the 8th Air Force's six great operations from May 12 to September 12, the bombing and loss of Ploesti, and RAF attacks on oil plants in Germany, the production of German oil was reduced 75 per cent for September.

Up to January, 1945, over 100 major marshalling yards, airfields, bridges, railroad cuts, communication centers, and troop concentrations from the central battle area back to the Rhine area were bombed repeatedly. The largest day's effort was December 24 when we flew 5,102 sorties. These figures represent the combined effort of the Tactical Air Force and of the 8th Air Force which joined in the tactical operations.

In German headquarters it must have been felt that, cost what it might, something had to be done to stop the galling air attacks. On January 1, 1945, the Germans sent over from 500 to 600 planes to attack RAF and AAF airfields in France, Belgium, and Holland. The Nazis lost almost 300 planes but they succeeded by this well-planned and well-executed attack in destroying 155 Allied planes. The operation did not interfere with the Allied air effort but it illustrated once again the fact that the German Air Force is not to be underestimated.

The AAF takes pride in the message sent by General Eisenhower to General Marshall on September 3: "The air has done everything we asked."

The Mediterranean Theater

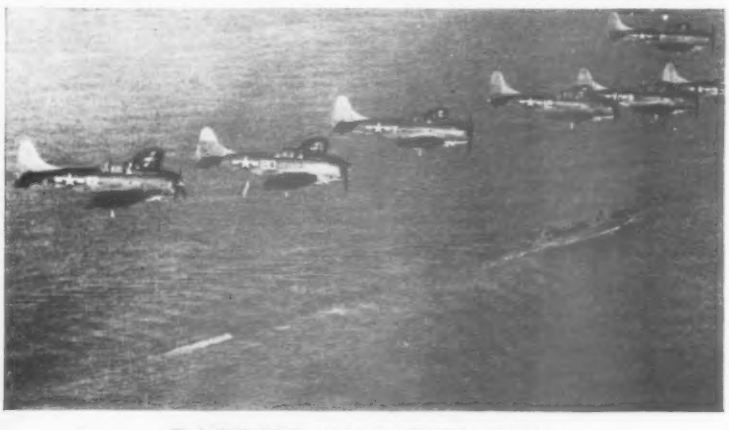
The 15th Air Force was activated November 1, 1943, and the next day flew its first mission, bombarding the Messerschmitt fighter plants at Weiner Neustadt. By midwinter new groups were crossing the Atlantic, to be trained in Africa and join in the strategic assault on Europe.

April, 1944, saw the beginning of the campaign by the Mediterranean Allied Air Forces, under Lieut. Gen. Ira C. Eaker, with the 15th Air Force, under Maj. Gen. Nathan F. Twining, to attack the strategic targets beyond working range of our British-based bombers. By the end of May the MAAF could send 850 escorted heavy bombers against German war production throughout Europe. In the year's operation, ended November 1, 1944, 15th Air Force *Flying Fortresses* and *Liberators* and long-range fighters flew 150,000,000 miles to hit 620 targets in 12 different countries and dropped 192,000 tons of bombs.

In its first year, 3,635 enemy aircraft fell before the firepower of the 15th's bombers and fighter escorts, and 2,016 more enemy aircraft were destroyed on the ground.

Forty per cent of Adolf Hitler's oil has gone up in the fires set by 15th Air Force bombers. His war machine once consumed 1,400,000 tons of fuel (gasoline and oil) per month. One-half of that came from the Romanian oil fields and synthetic oil refineries in southeastern Europe and the Balkans.

Since last April, when the campaign began, the German fuel supply has been cut by approximately 564,000 tons a month in attacks on oil refineries in Romania, Austria, Hungary, Czechoslovakia, Poland,



CARRIER TARGET SLED

THE white wake 1,000 feet astern of the carrier pictured here is created by a tow-target sled. A spar affixed to two trailing paravanes is attached by a cable to the carrier's stern and creates a well-defined target for the Douglas *Dauntless* dive-bombers which are shown in formation preparing to peel-off for their practice run.

Pilots attack from any position forward of the ship's bow and generally release their bombs at 1,500 to 2,000 feet. Practice is only conducted when the task force is not within possible striking range of the enemy.

Finish the Fight — with War Bonds

"Ground Flight" of a Boeing Superfortress

You're looking at one of the world's strangest laboratories . . . hidden in a closely guarded corner of Boeing's huge Seattle plant. It's a one-room house alongside a large steel frame in which an engine and a section of wing are firmly anchored. House, frame and engine can all be revolved on a circular track.

Designed by Boeing engineers, it is capable of testing the characteristics of the most advanced power-plant installations planned for great warplanes and transports of the future! The picture above was taken when the Boeing B-29 Superfortress—which is now being flown so valiantly by Army Air Force crews in Japanese skies—was still in the development stage.

Hour after hour, week after week, the 2200-hp. engine roared and tugged at its captive wing section. Inside the little laboratory the test crew watched a battery of instruments. They were testing the functioning of the power-plant with its many services and accessories at various engine speeds and powers—finding out how a new nacelle design affected their operation.

The B-29 nacelles offered Boeing engineers a particularly tough problem. Each one had to be big enough to accommodate a huge, complicated radial engine, dual turbo-superchargers, three separate cooling systems, intake and exhaust systems, electrical and ignition systems and fuel lines—besides the retractable landing gear housed in the inboard nacelles. Yet, aerodynamically, each had to be slim and compact, to reduce drag to a minimum, for the B-29 was to be a bomber with the speed of a pursuit ship.

The long bombing missions flown by the Superfortresses, through every variation of climate and temperature, are striking testimony to the success of Boeing engineers in solving this and other problems.

Sound research, design, engineering and manufacture have always gone into every Boeing product . . . one reason why you can depend on peacetime aircraft of the future, "Built by Boeing" to lead the way.

DESIGNERS OF THE B-29 SUPERFORTRESS • THE FLYING FORTRESS • THE NEW STRATOCRUISER
THE KAYDET TRAINER • THE STRATOLINER • PAN AMERICAN CLIPPERS

BOEING

Germany, and Yugoslavia.

One-third of the German oil supply came from the rich fields of Romania centered at Ploesti. Protected by 250 heavy guns, interceptor nets and smoke screen, it was the third most heavily defended target on the continent.

Ploesti was finally knocked out in a three-day assault in August. In 23 attacks, 19 of which were by the 15th Air Force, the bulk of its production had been denied to the Nazis. The cost was 2,277 airmen lost and missing and 270 aircraft. A conclusion to the operation was to be found in the return of 1,000 missing airmen from Bucharest, riding in the same *Flying Fortresses* that 12 days before had taken part in the last Ploesti bombing.

A significant development in our aid to the Soviet Union was the inauguration of the shuttle bombing operations. On June 2, *Flying Fortresses* escorted by *Mustangs* flew to Soviet bases and bombed Hungarian rail yards en route. From the U.S.S.R. they attacked air bases on the lower Danube and on their return to Italy June 11 bombed airdromes in Romania. The trail thus blazed was later expanded into a three-way shuttle by 8th Air Force bombers from England.

The cost of the one-year campaign by the 15th Air Force has been approximately 2,247 planes in combat, for a ratio to sorties flown of 1.6 per cent.

The role of the 12th Air Force, primarily, has been to operate with and assist the ground forces in their penetration of Axis Europe. The 12th has also demonstrated, in "Operation Strangle," [see FLYING, April, 1945, page 34] the ability of an air force to create an interdiction on such a scale as to affect the battle for Germany itself.

The scope of 12th Air Force operations in 1944 is indicated by the advances of the Allied forces on the ground to the present line across northern Italy; the destruction or capture of thousands of enemy trucks, rolling stock, and materiel; and the destruction, probable destruction, or serious damage of 973 enemy aircraft in the air and on the ground. The 12th flew 182,122 sorties and dropped 75,495 tons of bombs in 1944. It lost 1,081 planes through enemy action, antiaircraft, and other losses on missions during the same period.

The Air War Against Japan

Preparatory to the invasion of the Marshalls, land-based aircraft pounded the Japanese strong points for 90 days. During that time the 7th Air Force's heavy bombers alone flew 1,135 sorties. On Kwajalein our *Liberators* demolished the radar installations so effectively that when the time came for our amphibious forces to strike the fleet was able to make its approach undetected. The Navy's planes brought these attacks to a climax with a series of massive strikes.

In addition, the 7th undertook to destroy aircraft and air facilities on Maleolap, Wotje, Roi, and Kwajalein, should they still be operational on D-plus-2 day. Thereafter, the primary mission was to keep the Wotje and Maleolap bases neutralized.

With the islands of Kwajalein and Eniwetok in the Marshalls occupied by our ground troops, we established an aerial blockade of the by-passed atolls still held by the Japanese. This enabled our ground troops to consolidate their positions and make further advances unmolested by enemy air action. Combined Army, Navy, and Marine air forces thus isolated 20,000 square miles of Japanese-dominated area in the Marshalls. By the time of our invasion of the Marianas, Japanese bases such as Nauru in the Gilberts, and Mille, Jaluit, Maleolap, Wotje, Rongelap, Aur, Arno, and Likip in the Marshalls were not considered to be targets for sustained air attack. A continued harassment was carried on with fighters, dive bombers, and occasional medium-bomber raids. At this writing, scores of thousands of enemy troops are being held in virtually complete isolation in the Ocean Islands, the Marshalls, Marianas, and Carolines.

Truk, once the most heavily-defended island in the Carolines and the keystone of the entire Japanese defense system in the central Pacific, is now to a large extent neutralized. It is dangerous to the extent that it is willing to commit its dwindling fighter force against our regular bombardment. Other enemy bases in the Carolines—Kusai, Ponape, Puluwat, Woleai, Yap and Pingeolap—have been bombed into impotence. Iwo Jima, in the Volcano islands, underwent the same systematic bombing before the recent invasion. Wake and Marcus islands are no longer serious threats.

The mission of the 7th Air Force fighters in the Marianas was the defense of the islands, special raids against airfields, gun positions, and communications on Saipan, Tinian, Guam, Rota, and Pagan. Some of our *Thunderbolts* flew daylight shifts, and *Black Widows*, new in the Central Pacific, operated at night. From July 1 to July 31, when Tinian was secured, 7th fighters flew 3,430 sorties, some of the men averaging two or three a day.

Weather hazards have been chief factors in curtailing the operations of our 11th Air Force based on Alaska and the Aleutians. To date, the mission of the 11th (commanded by Maj. Gen. Davenport Johnson) has been to force the Japanese to deploy precious air strength in the area of the North Pacific. By mounting, in the face of harsh Arctic conditions, a series of harassment raids against the Kuriles, the 11th has drawn a part of the Japanese Air Force to the defense of the Kuriles and Hokkaido. At the same time, we have succeeded in establishing a chain of operational bases which sealed off a vital sector in our continental defense system.

The South and Southwest Pacific

In January, 1944, our most advanced AAF base in the South and Southwest Pacific was on Stirling Island, 100 miles south of a fighter field established at the United States beachhead on Empress Augusta Bay, Bougainville Island, in the Solomons. In the Bismarck Sea area, the enemy's airdromes on western New Britain Island had been captured. The AAF had several advanced fighter fields located in the Ramu River Valley, at Nadzab, in the Markham River Valley, at Finchhafen on the Huon coast in New Guinea, and on the Trobriand and Woodlark Islands, and Goodenough Island.

Opposite these sectors, the Japanese Air Forces had deployed approximately 700 aircraft, concentrated primarily in Rabaul on New Britain and in Wewak and Hollandia on New Guinea.

As a result of previous American air action, these forces were definitely on the defensive. Due to continuing attacks by the 13th and 5th Army Air Forces, the enemy's dispositions both at Rabaul and Wewak were somewhat topheavy in fighter planes.

During January and through most of February, General Streett's 13th and the U. S. Naval air forces, based in the Solomons, concentrated on the job of knocking out Rabaul as a major air threat. Just before the end of February—after having lost nearly 900 aircraft in defense of the base—the Japanese withdrew their remaining air strength from Rabaul. In consequence, Japanese ground forces on New Britain were forced to abandon virtually all of the islands. The shipping lanes which had supplied the doomed Japanese garrisons in the Bismarcks and

the British Say . . .

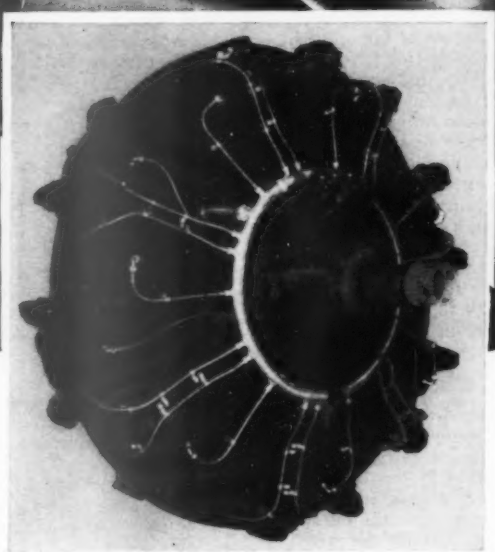
NORTH American *Mitchells* in Australia are reportedly fitted with a 25-mm. cannon on top of each engine, synchronized to fire between the propeller blades. . . . The Eastern Aircraft *Wildcat* (FM-2) is powered with 1,200-h.p. Wright GR-1820-56. . . . The Grumman *Hellcat* (F6F-5) is powered with a 2,100-h.p. Pratt & Whitney GR-2800-C while the *Tigercat* (F7F-1) has two GR-2800-C's of the same horsepower. . . . The Lockheed *Harpoon* (PV-2), successor to the *Ventura* (PV-1), has two 2,000-h.p. GR-2800's, span is 75 feet, length, 52 ft. 2 in. . . . These facts were given for the Martin *Marauder* (B-26C): wing loading is well over 50 lbs. per sq. ft. Armament is 12 .50-cal. machine guns. Gross weight is 35,000 pounds, top speed 320 m.p.h., cruising speed 235 m.p.h., The Curtiss *Seahawk* (SC-1) is a new catapult seaplane for the U.S. Navy. . . .

—THE AEROPLANE SPOTTER

The Vultee *Vengeance* is being operated in Britain as a target tug. . . . A contract has been placed with the Edo company for a small number of single-engined reconnaissance planes, designed by Edo for the U.S. Navy. . . . The long-range reconnaissance version of the Consolidated *Liberator* carries six cameras, is designated F-7 by the AAF. . . . The AAF's ATC is operating about 100 *Skymasters* (C-54) across the Atlantic. . . . The original Republic *Thunderbolt* design supposedly called for an Allison engine. . . . Some Lockheed *Lightnings* now carry a bomb load of 5,200 pounds. . . . Other *Lightnings* are carrying as many as seven rockets under each wing. . . .

Bell *Airacomets* (P-59A) were used experimentally against flying bombs (V-1) in England last year . . . The Bell XP-57 was an *Airacobra* with a radial engine . . . *Thunderbolts* in Italy are flying mail to troops at the front in their droppable fuel tanks under each wing. . . .

—THE AEROPLANE



1. Inner flexible conduit affords maximum physical protection to wiring.
2. Braided wire covering, sometimes in multiple layers, improves the electrical shielding and provides increased ruggedness.
3. Main conduit manifold is bent to shape from seamless tubing.

Electrically Sealed Circuits

WITH BREEZE RADIO IGNITION SHIELDING

The Breeze Radio Ignition Shielding which equips the modern aircraft engine is the product of extensive laboratory test and research.

Effective shielding calls for a metal case of high conductivity around possible sources of radio interference, designed to lead off high frequency impulses to the ground and prevent their radiation. Each installation must be custom engineered to meet the needs of the problems involved.

Breeze Shielding is designed for ruggedness, resistance to vibration, and maximum isolation of high frequency interference. Each wire of the braided cover must be positively soldered at each connection, inner conduit must be tight to avoid electrical leakage, and fittings must be precision-machined for close fit and uniform pressure of contact faces.

New shielding problems presented by the rapid advance in the science of radio communication and television are constantly being solved by Breeze engineering. A background of many years experience in shielding automotive, aircraft, marine and commercial engines has made Breeze America's headquarters for Radio Ignition Shielding.

Breeze BREEZE MARK

CORPORATIONS, INC.

Newark, New Jersey

the Solomons were controlled by us.

Simultaneously, the 5th Air Force was knocking out Wewak as a major enemy base.

In four days of concentrated attack the 5th Air Force put Hollandia out of the running. The entire enemy force of approximately 400 aircraft—was destroyed—mainly on the ground. The 5th Air Force then turned its attack on the islands of Biak, Noemfoor, and Owi in the Geelvink Bay area of Dutch New Guinea. Again enemy air was neutralized, and our amphibious forces moved in with light casualties.

The Philippines

The next objective of the 5th Air Force, now commanded by Major General Whitehead, logically became the Mindanao area of the Philippines. Here the enemy had based approximately 250-300 aircraft on partially-completed fields. We were able to inflict substantial losses before the Japanese withdrew again, this time to the Visayan area.

The 7th Air Force brought heavy bombers to the Palaus and joined in pounding the central Philippines. In November, units of the 5th Air Force were on Leyte, operating from airdromes constructed with remarkable speed under great difficulties.

The Far Eastern Air Force (the 5th and 13th combined under the command of Lieut. Gen. George C. Kenney) had flown from January 1 to December 31, 1944, 155,107 combat sorties. During that period they dropped 90,087 tons of bombs. Through November, 1944, 326,490 tons of enemy shipping were sunk, 197,982 probably sunk and 540,500 tons damaged. Also through November they consumed 143,257,000 gallons of gasoline. From January 1, 1944, through December 31, 1944, they destroyed 2,414 enemy aircraft, probably destroyed 563, and damaged 692 while losing in combat 818 of our own.

No account, however sketchy, of the Far Eastern Air Forces, would be complete without reference to the superior work of the troop carriers who, in addition to dropping paratroops, fly men, ammunition, food, and supplies into bitterly contested forward areas. On return flights they evacuate the sick and wounded to hospitals in the rear. One troop carrier group, the "Jungle Skippers," has flown over 3,000,000 miles, transported over 24,000,000 pounds of high priority equipment, and carried more than 50,000 combat soldiers on missions involving 20,000,000 passenger miles.

The Air Forces in China

Throughout the year the 14th Air Force was opposed by approximately 500 Japanese aircraft operating out of large, fully supplied, powerfully supported bases.

The basic fact to be considered in an appraisal of the operations of our 14th Air Force and the Chinese-American Composite Wing is that they had access only to such supplies as could be flown across the Hump to China. In consequence they had to contend with chronic shortages of gasoline, replacement parts, base equipment, and virtually everything else. By heroic exertions we managed to increase our Air Transport Command tonnage across the Hump from 13,399 tons in January, 1944, to 43,896 in January, 1945. With the addition of a supplemental route via Myitkyna further increases may be expected.

The 14th Air Force was able to provide vital tactical co-operation to the Chinese Army. During a representative period (May 29 to July 5) the 14th was able to interfere with the progress of the advancing Japanese armies to the following extent: 60 enemy aircraft destroyed or damaged, 900 river boats destroyed, 32 bridges destroyed, 26 storage dumps destroyed, 139,400 tons of supply dropped to the Chinese ground forces, 14,740 Japanese troops killed or wounded, exclusive of personnel lost on ships and boats sunk or strafed.

As the current Japanese offensive pushed back the Chinese ground forces, General Chennault was forced to evacuate and destroy most of his forward fields, including the modern ones built under desperately trying circumstances at Hengyang, Kweilin, Tanchuk, and Liuchow. In spite of the fact that Japan threw some of its best pilots into this offensive, the 14th was able to establish a favorable combat ratio.

An outstanding contribution of the 14th has been the brilliant achievement of a handful of specially equipped *Liberators*. Beginning their operations during late spring against Japanese shipping in Formosa Strait and the South China Sea, each of these airplanes has averaged about 800 tons of shipping sunk per sortie. This attrition has put a fearsome burden on the long Japanese lines of communication to the Southwest Pacific and on Japan's dwindling merchant fleet in general. The work of these few *Liberators* may be said to have produced effects of far-reaching strategic importance. During 1944 the overall claims of the 14th Air Force against Japanese shipping were 640,900 tons sunk, 237,050 tons probably sunk and 396,950 tons damaged.

Burma and India

The air transport route from Assam to China has been virtually free from interference by enemy fighters since the end of 1943. American and British transport planes have served as the principal and often the sole source of supply and reinforcements for ground forces fighting on the widely scattered Burma fronts. Japanese road, rail, and river communications throughout Burma have been so thoroughly held down by round-the-clock air attacks that the enemy has repeatedly been forced to abandon attempted offensives. Strategic bombing and mining has denied to the Japs the use of the principal Burma coast ports, including the harbors of Moulmein and Rangoon. Cooperation of fighters, dive bombers, and medium bombers with campaigning ground troops has been carried to a high degree of precision and has been extremely effective.

Air supremacy over Burma was essential, and to this end all RAF and AAF combat units on the Burma front were formed into the Eastern Air Command under Maj. Gen. George E. Stratemeyer.

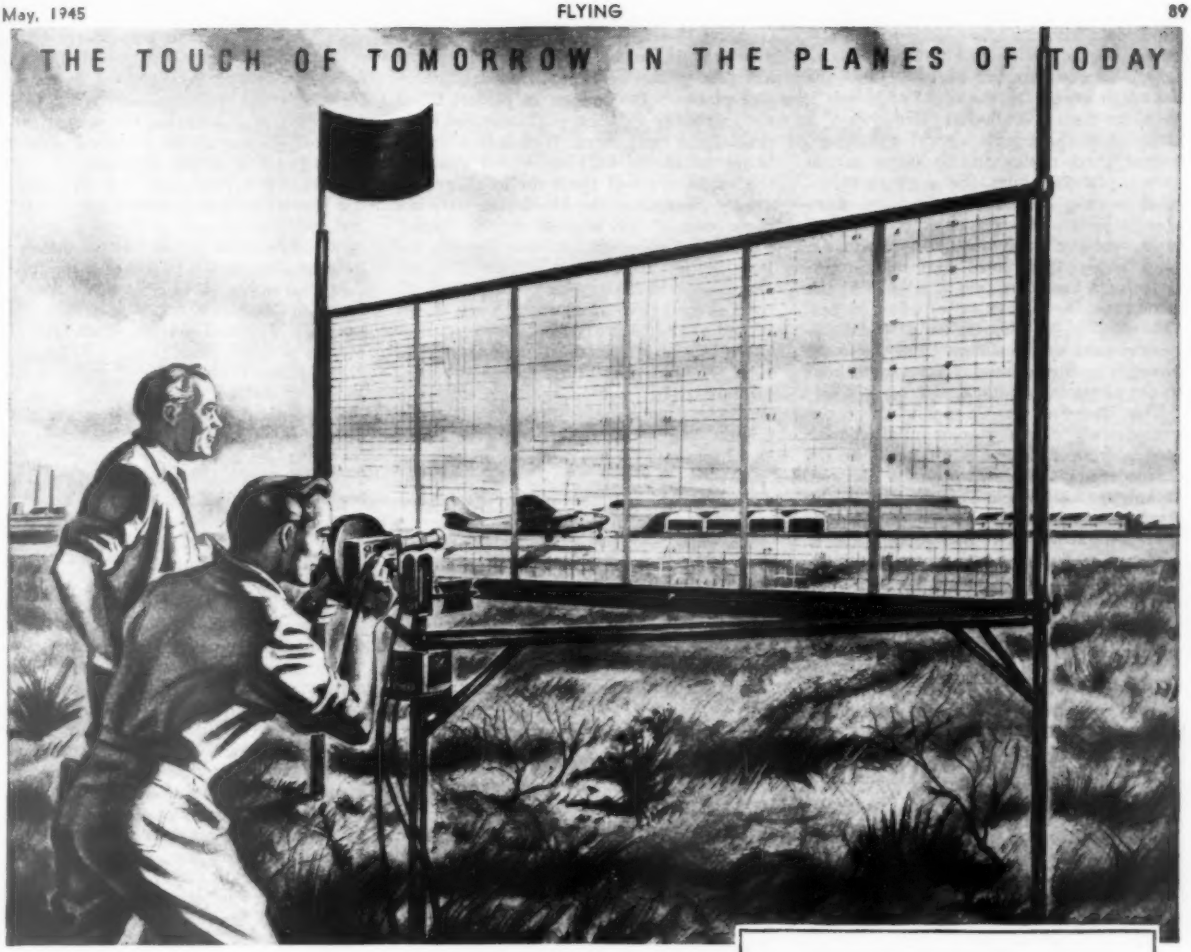
The Eastern Air Command's counter-air-force measures were successful. By early spring the Japanese were avoiding air combat. Their offensive raids against our ground forces and transports flying the Hump route practically ceased. Today the character of the Japanese air effort in Burma continues to be sporadic, reluctant, and ineffectual.

The accomplishments of the First Air Commando Group, under Col. Philip G. Cochran, represent one of the spectacular operations of the war. To disrupt the Japanese lines threatening General Stilwell's North Burma operations, the AAF

AIRLINE SERVICE, POST-WAR

POST-WAR passengers aboard giant DC-4's and DC-6's will be served meals like the one pictured above. Trying out new ideas in meal service, United Air Lines used a mock-up of a future airliner and had employees serve as guinea pigs in testing new lightweight dishes and four-person seating arrangements. Stewardess Jean MacDonald serves a full-course meal while Mrs. Jean Arbogust, dietitian, takes notes.

THE TOUCH OF TOMORROW IN THE PLANES OF TODAY



SCREEN TESTS FOR A NEW STAR

Across the "screen" flashes an airplane powered by the latest model Ranger engine.

Its progress is recorded on film.

Does its performance surpass expectations? What's the exact rate of climb from the take-off? Is the propeller and engine combination correct?

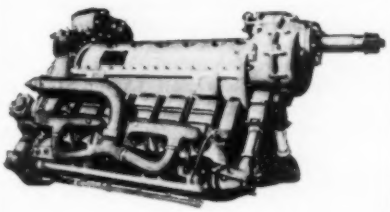
Study of the screen test films will show.

Through this and other carefully controlled scientific testing, Fairchild engineers are proving the efficiency, versatility and endurance of Ranger engines.

Constantly improved since its inception, the Ranger engine today packs more power into an even more efficient package. Fairchild research and engineering skill have developed a flying power plant that is "inline for the airlines."

The emphasis is on efficient horsepower production; length of service between overhauls; ease of maintenance; and economy.

Today, flying over test fields in ships that are basic designs for the airplanes of tomorrow, Ranger models, like all products of Fairchild research and experience, provide a "touch of tomorrow in the planes of today."



THE RANGER TWELVE

Skillful engineering has built these qualities into Ranger engines:

- High speed for *smooth* power
- Inverted for a wider field of vision
- Inline for minimum drag and maximum flexibility
- Aircooled Al-Fin cylinders for greater power
- Precision construction and quality materials for long life

BUY U. S. WAR BONDS AND STAMPS

RANGER AIRCRAFT ENGINES

Division of Fairchild Engine and Airplane Corporation • Farmingdale, Long Island

transports towed gliders loaded with airborne engineers and equipment and infantry more than 150 miles behind the Japanese lines. On the night of March 5, 1944, the gliders landed at "Broadway," a clearing in the jungle, carrying 539 personnel, three mules, and 29,000 pounds of stores. In 24 hours the engineers had built a strip on which transports were able to land with cargoes of troops, supplies, and pack animals. Other trips behind the Japanese lines were made regularly for a period of two months. At the same time, long-range penetration groups, also supplied by air, slashed at the Japanese communication lines. The Japanese airfields in the Mandalay area were kept under continuous attack.

The Eastern Air Command kept approximately 200,000 troops supplied with food, ammunition, and equipment. In 758 sorties transports flew an entire division, complete with pack animals, from the Arakan into Imphal. During the 80 days that Imphal was cut off, 28,120 tons of supplies and 61,000 men were flown in. By ground-air combination the Japanese offensive was turned into a retreat with three of their divisions virtually annihilated.

In the important capture of the Myitkyina airfield, Major (then Brigadier) General Merrill's "Marauders" were supplied by air. A few hours after the Myitkyina strip had been captured, troop-carrier planes were towing in gliders filled with airborne aviation engineers and their specialized equipment. Within five hours, using miniature bulldozers and graders, the engineers had the field in shape for use by transports. The Myitkyina strip became one of the busiest in the world. From May through October the air lift into North Burma by Major General Davidson's 10th Air Force totaled 98,823 tons. More than 75,000 men were flown in and over 10,000 casualties evacuated.

While engaged in these operations, the 10th Air Force also supplied air co-operation to General Stilwell's forces, the British 36th Division, and various Chinese units. Converted *Liberators* of the 7th Bombardment Group also flew more than 1,500,000 gallons of aviation fuel from India to the gas-hungry 14th Air Force.

The Superfortress

On June 5, just two days less than a year after the Army had flown a *Superfortress* for its first time, the 58th Wing took off on its first bombing mission to Bangkok, Thailand. Then, on June 15, as part of the newly formed 20th Air Force, they bombed Yawata and brought the attack directly to the Japanese homeland.

On August 10, the *Superforts* of the 20th Bomber Command staged the longest-range bombing operations in the history of aerial warfare—and what was a joint operation covering the widest range between targets ever bombed simultaneously by a single organization. The targets were Nagasaki and Palembang, the former in the Japanese homeland on the southern island of Kyushu and the latter at the outermost limit of the Japanese empire on the island of Sumatra.

In November, 1944, just after the 20th Bomber Command under Maj. Gen. Curtis E. LeMay had completed its 17th successful mission, Brig. Gen. H. S. Hansell's 21st Bomber Command, flying out of Isley Field on Saipan, joined forces with the 20th Bomber Command by striking the Japanese mainland. On November 24 they bombed Tokyo. By January 9, 1945, Tokyo targets had been bombed six times. Maj. Gen. Curtis E. LeMay now heads the 21st Bomber Command with Brig. Gen. Roger Ramey commanding the 20th Bomber Command.

The central fire-control system, the "magic little black box," takes much of the guesswork out of gunnery. In the first six months of combat operations only 15 *Superforts* were lost by enemy fighter action in the air. In contrast, 102 Japanese planes were destroyed, 87 probably destroyed, and 156 damaged in air combat.

As 1944 drew to a close each plant producing *Superfortresses* was completing on the average of more than one plane every 24 hours. As production increased cost decreased. The first B-29 cost $3,392,396.60. Those coming off the production lines today cost approximately $600,000. A total of 157,000 man-hours were required to produce the first *Superfortresses* to roll off the line; those produced today require only 57,000 man-hours.

We have organized floating maintenance and repair shops manned by experienced airplane mechanics, propeller specialists, sheet metal workers and other skilled craftsmen who can be moved to any spot where they are needed. Such a ship designed to service *Superfortresses* carries a stock of 137,000 spare parts and can do just about any repair job necessary to keep the big bombers flying.

Strategically, except for the much greater distances involved, the B-29 is being employed against Japan in much the same way that our *Fortresses* and *Liberators* are being used against Germany—to destroy the enemy's ability to fight by destroying his production of critical war equipment and his facilities for transporting this equipment.

The problem of destroying Japan's industrial power is not simple. Her inner empire—the islands plus Korea and Manchuria—covers more than 730,000 square miles and is a highly developed, almost self-sufficient industrial and agricultural unit three times the size of Germany.

By December 31, 1944, the B-29 and the 20th Air Force had completed 39 strikes. These strikes, some large, some small, are continuing on almost a daily basis. END

[The concluding portion of General Arnold's report will be published in the June issue of FLYING.*]*

TARGET TRABUCO

TRABUCO is the perpetual target of Marine dive bomber and fighter pilots based at the U.S. Marine Corps Air Station at El Toro, Calif. At this target range, set back in the hills north of Laguna Beach, *Dauntless*, *Corsair* and *Helldiver* squadrons put in thousands of flying hours acquiring the timing and team-work necessary between bomber and protective fighter groups.

Groups of more than 100 planes swoop down over the targets at Trabuco which simulate Japanese destroyers and grounded planes outlined in lime on the ground. Dive bomber pilots are schooled in spacing, peel-off and diving. Covering fighters are taught the close protective weave necessary when accompanying the dive bombers earthward or while in close compact formation and "squeezing down" to discourage enemy fighters from infiltrating between the cover layers. Photograph below shows element of *Corsairs* leaving target as their practice bombs explode.

THE BELL HELICOPTER

A new kind of flying

THOUSANDS of inquiries demonstrate an enthusiastic interest in the new Bell Aircraft helicopters.

One reason is that the helicopter provides a kind of flight we have always sought. In a helicopter, you can go straight up and down, you can hover, you can go sideways or backwards. All these things, impossible in a conventional airplane, can be done in a helicopter with safety and precision control.

And that accounts for the questions . . .

THE QUESTION OF WHEN . . . It is hard to draw a line between enthusiasm for the helicopter and realistic thinking on when helicopters will be available.

Bell Aircraft believes in the helicopter, believes in it as a practical aircraft, a safe aircraft, an aircraft with an important post-war future. We, too, are impressed by what it can do. In addition to its other advantages, for example, a helicopter doesn't need elaborate landing facilities and airports, and in "helicopter weather" with ceiling and visibility near zero, the helicopter can fly because of its ability to operate at low, safe speeds.

But the fact remains that helicopters, of the kind we expect to market, are not available now. Aside from the requirements of war work, which at Bell Aircraft come ahead of everything else, a lot of developmental work remains to be done.

And so it will be after the end of the war—say, a year or more—before Bell helicopters are available. But—helicopters *are* coming.

THE QUESTION OF COST . . . How much will a helicopter cost?

That depends on the kind and size of helicopter built, the volume of production and many other things.

The first Bell helicopters, however, will not be in the "low price car" field.

This means that the first helicopters will probably be sold to commercial and industrial concerns which have a need for them and which will find it economical to buy helicopters for business purposes. For such uses, the cost of the helicopter will be of less importance than its utility.

Low-priced helicopters will come—with mass production and further development.

ABOUT STABILITY . . . One of the most important characteristics of a helicopter is stability. The Bell Aircraft helicopter has it —engineered stability—through the use of a patented stabilizing bar which acts much like a gyroscope.

WHAT CAN YOU DO WITH A HELICOPTER?

Bell Aircraft feels that the helicopter will develop through various stages.

First, it will be used by industrial concerns that need it and can afford maintenance facilities and professional pilots.

Second, the helicopter will get into other commercial channels when circumstances make it possible to use them more widely.

Third, and later on, the helicopter will be used by sportsmen pilots and others who want safe, dependable air travel regardless of terrain conditions and despite poor weather. And finally, helicopters will get into the general market.

Bell Aircraft does not believe that the helicopter will compete with fixed-wing planes, but rather that it will open up a new and still untapped field of flying, a new dimension of flight.

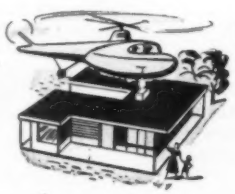
AND IN CONCLUSION . . . We probably haven't answered all your questions. But we have tried to tell generally how helicopters work; what they can be used for; and how we think about them.

If you would like to know more, a booklet giving details regarding the Bell helicopter will be mailed without obligation. Write the Bell Aircraft Corporation, 2050 Elmwood Avenue, Buffalo 7, New York.

★ *Buy War Bonds and Speed Victory* ★

Specialized uses for the helicopter are many and varied. For example:

Suburban ambulance service



Commuter service

Forest fire control

Pipe line patrol

Coast Guard rescue work and disaster relief

Also for geological survey work, crop dusting, short hauls for mail, short hauls for commercial cargoes, department store rural deliveries, feeder lines for commercial air lines, mining work where the terrain makes access difficult, laying cables and wires, personal transport to and from places which lack air terminal facilities, and many other uses.

MEMBER AIRCRAFT WAR PRODUCTION COUNCIL...EAST COAST, INC.

BELL *Aircraft*

PACEMAKER OF AVIATION PROGRESS

NIAGARA FRONTIER DIVISION
Buffalo and Niagara Falls, N. Y.
Airacobra (P-39) and Kingcobra (P-63)—Fighters
Airacomet—America's First Jet Propelled Plane
The Bell Helicopter

ORDNANCE DIVISION
Burlington, Vt.
Flexible Gun Mounts and other ordnance materials

GEORGIA DIVISION
Marietta, Ga.
B-29 Boeing Designed Superfortress

© Bell Aircraft Corporation

Twenty Days on a Raft

(*Continued from page 63*)

kept my sea anchor out so the raft would ride "bow-into-the-waves." At night my parachute silk reduced the shock of being hit by breaking waves but it did not keep me dry. The constant pounding of the waves was nerve-wracking. I soon started cussing at them. The cussing gave way to screaming and then I got hold of myself. I stopped and prayed for strength to withstand the pounding.

I carried morphine syrettes in my emergency kit for relief from severe pain. When my nerves seemed near the breaking point, I used the morphine to give me relaxation. When I was under its influence, the pounding of the waves ceased to irritate me. I resorted to it on three different occasions, all of them at night.

The three weeks that I spent adrift in the Coral Sea had exciting moments. I had always wanted to see a whale and during the first week that wish was fulfilled six times. The first appeared on July 16. I heard a noise like large rollers breaking on a beach. Looking in the direction of the noise, I saw two whales of the sperm or blackfish type. One was coming right toward my raft. He would roll on the surface of the water, blow, then submerge for almost 100 feet before coming to the surface to roll and blow again. I tried to paddle out of his way but made no headway in the heavy sea.

I thought of shooting him with my pistol but soon decided that I could not kill him with such a small weapon and that the shot would only enrage him. I put my pistol and paddles away, checked to see that all my equipment was secured to the raft, inflated my "Mae West" and waited for the crisis. The whale came to the surface, put his nose against the starboard side of the raft, pushed it about 10 feet through the water and then slid under the boat. He was about 40 feet long and, as he slid under me, every inch of that 40 feet seemed like a mile. The water was clear as a crystal ball and I watched that huge mammal submerge on the port side of the raft. He continued on his way, rolling and blowing.

At dusk on July 18 I heard a violent splashing off my port beam. On closer observation I saw what appeared to be a fight between a marlin and a mackerel. The marlin was seven or eight feet long, had an 18-inch "spike" and apparently was trying to catch the 30-inch mackerel. The fight was one of the most violent actions I have ever witnessed. The two fish came directly toward my raft and the last time they jumped out of the water and splashed back in they were just three feet from me. I had visions of the marlin's "spike" piercing my raft and leaving me on the ocean without a seat. God was with me for the fish disappeared and I didn't see them again.

On July 20 I saw the first of many Japanese planes that I was to see before being rescued. I drifted on a course of about 300° deep into enemy waters. A few enemy planes passed directly over me as low as 500 feet but failed to see me. I saw an average of one plane a day from then on, some friendly, some enemy, and others too far away to be recognized. I signalled some with tracer ammunition from my .45, with a mirror which I flashed in the sun, and with sea marker dye. But not one was to see my signals until August 1.

On July 24, I saw my first shark.

Ordinarily the sea anchor held the bow of the raft into the waves, but around 1330 on this day, I noticed that I was riding sideways up the waves. A fish line which I had secured near the center of the starboard side of the raft was taut and drawn out at a 90° angle to the side of the raft. Suddenly the fish line snapped, the raft swung back to its usual position, and a shark's fin broke the surface of the water. He swam under the raft and with his dorsal fin cut a fish line that I had secured to the port side. Thinking a dead shark would float, I tried to shoot him. The bullet hit, the shark jumped from the water, then floundered and sank. The same thing happened when I tried to shoot a mackerel, So I decided not to waste ammunition on fish.

On July 28 and 29 half a dozen sharks were with me day and night. Only one, however, made an attempt to attack, and it was small, about four feet long. Most of those I saw were at least six or seven feet in length. My lone would-be attacker rolled over on its side and turned almost belly-up to get into position to bite. I could see its curved mouth, ugly teeth, and beady eyes.

But again God was with me. My enemy failed to carry through his attack.

At dusk on July 29 a huge wave threw the raft end-over-end. Luckily I had all of my equipment securely lashed to the raft and the raft itself was secured to my body by a 12-foot length of shroud line. I had seen sharks less than half an hour before and now I thought of the possibility that they were still lurking unseen in the black water.

At one point in my training I had been told that sharks were cowards and that they would hesitate to attack a man who moved about violently, so I kicked and splashed with all my might while I righted the raft. I succeeded in getting aboard with little difficulty and was happy to find that not a single article of equipment had been lost.

On August 1 at 0900, after seeing nothing but Japanese planes for several days, a New Zealand land-based Lockheed *Hudson* passed very close to me. The tail gunner saw the sea marker dye I had spread on the water.

The plane turned, made a wide circle and flew down close to the raft. For the first time in my life, and I hope the last, I cried for joy. The New Zealanders circled for about one hour. I was afraid they would check my position and leave without dropping supplies and, frankly, I was getting pretty hungry and thirsty by this time. I put on my rubber paddles, leaned back in the raft, and signalled in semaphore the letters "E-A-T". They made another wide circle and dropped an inflated life jacket with supplies attached. The bundle hit the water about 30 feet from my raft. I paddled to it and found Army-type emergency rations, a canteen of water, a map marking my position, ammunition for my .45, a water-proof flashlight, first-aid equipment, a Very pistol and star shells, and other useful items. I was hungry but I ate sparingly, not knowing how soon I

(*Continued on page 96*)

The Goldfish Club
This is to certify that . . .
has qualified for membership by escaping death through the use of his emergency dinghy or life jacket
SIGNED
Max Karant
Secretary: American Division

The FLYING-sponsored American division of the Goldfish Club recently mailed out more than 600 membership certificates and sleeve insignia to flying personnel of the United States armed forces who have qualified for membership.

Life membership is free to qualified applicants. Applications should be sent to Max Karant, Managing Editor, FLYING, Chicago, Ill., attesting that the applicant's life was saved by an emergency dinghy or life jacket. Applications must be certified by the applicant's commanding officer and bear the applicant's name, rank, serial number, home address, service address, and the date and location of the incident.

FLYING's office will serve as headquarters for the American division of the Goldfish Club, which was originally founded for RAF and Fleet Air Arm personnel by Lieut. Col. F. Baden-Powell Weil in January, 1943. Colonel Weil is managing director of P. B. Cow, Ltd., English manufacturers of RAF emergency dinghies.

They shall not die!

They will *live* . . . to be the citizens, husbands and fathers of the future. Hundreds of thousands of American boys, wounded on far-off battle fronts, are being restored to health and life because medical care, through the swift sure mercy of air transportation, is only a few hours away. Douglas workers, builders of planes for the airlines yesterday and tomorrow, are glad that today their skill can thus bring prolonged life to the country's heroes. This is our first obligation until the war is over.

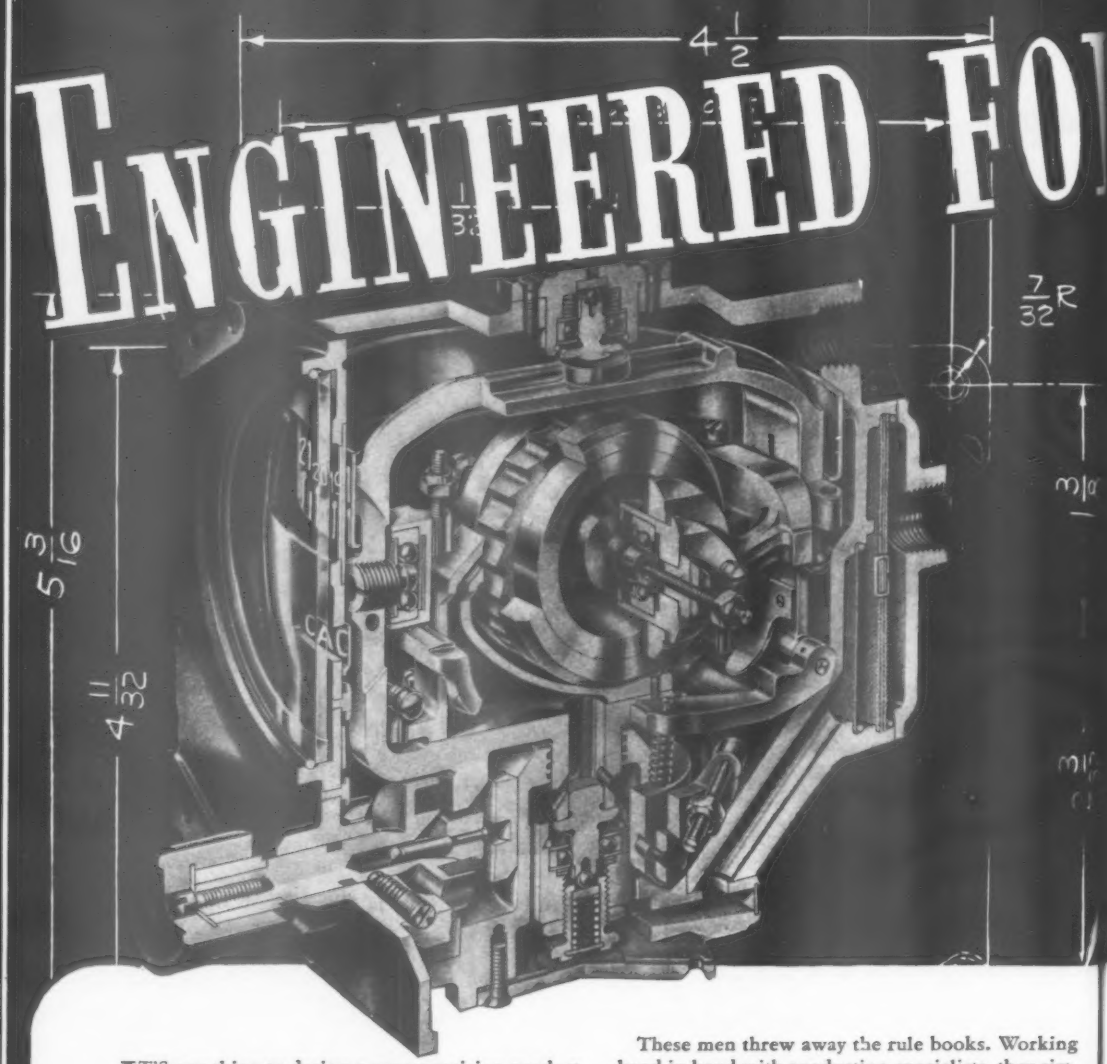
Donald W. Douglas.

GREATEST NAME IN AVIATION **Douglas**

DOUGLAS EQUIPPED AIRLINES: All American Aviation — American Airlines — American Export Airlines — Braniff Airways — Chicago & Southern Air Lines — Colonial Airlines — Continental Air Lines — Delta Air Corporation — Eastern Air Lines — Hawaiian Airlines — Inland Air Lines — Mid-Continent Airlines — National Airlines — Northeast Airlines — Northwest Airlines — Pan American Airways — Pennsylvania-Central Airlines — Transcontinental & Western Air — United Air Lines — Western Air Lines — A. B. Aerotransport (Sweden) — Aer Lingus (Ireland) — Aerovias Braniff, S. A. (Mexico) — Aerovias de Guatemala, S. A. — American Airlines of Mexico — Australian National Airways — Avianca (Colombia) — BOAC (British Overseas Airways) — Canadian Pacific Airlines — China National Airways — Cia. Mexicana de Aviacion — Cia. Nacional Cubana de Aviacion, S. A. — Cruzeiro do Sul (Brazil) — Indian National Airways — K.L.M. (Royal Dutch Airlines) — K.N.I.L.M. (Dutch East Indies) — IBERIA (Spain) — Panair do Brazil — Panagra (Pan American-Grace Airways) — PLUNA (Uruguay) — SABENA (Belgian Congo) — Swissair (Switzerland) — TACA (Central America) — TATA Airlines (India) — UMCA (Central America).

FIRST AROUND THE WORLD FIRST THE WORLD OVER

ENGINEERED FO



IT'S one thing to design a superprecision product —but it's a far tougher job to design it for speedy, low-cost mass production!

Take one example—aircraft instruments. These complicated mechanisms have more precision than the finest watch ever dreamed of. Yet these superprecision instruments are rolling off the production lines at a rate that was seemingly impossible until Jack & Heintz engineers redesigned them for mass production.

These men threw away the rule books. Working hand in hand with production specialists, they simplified design, figured out new methods of manufacture and assembly—licked dozens of problems that had been production bottlenecks. When they finished, they had an ultra high precision product that could be turned out in the mass quantities needed to keep up with the growing demands of our global war.

The same engineering job has been done on dozens of other vital wartime assignments—many

Jack & Heintz Inc., Cleveland, Ohio. Manufacturers of aircraft engine starters, generators, gyro pilots

of them still on the secret list—in Jack & Heintz engineering laboratories. The net result has been greater quantities of precision aircraft equipment in far shorter time—and with important economies in both manpower and money.

Valuable as it is in war, this unique and effective engineering ability holds equal promise for peace. Already, startling new developments are on the way from the minds and drawing boards of these men who won't take no for an answer.

Look to Jack & Heintz for better things for flying!

Gyro flight instruments, magnetos, motors.

JACK & HEINTZ
Incorporated

(Continued from page 92)

would be rescued. The New Zealanders flew by once more, wobbled their wings and headed for home.

I watched for a rescue plane the rest of that morning and all afternoon but none appeared. I watched, waited, hoped and prayed all day of August 2 [he had been down since July 14] but there was no rescue in sight.

About 2300 on August 2 my craft capsized again. I was rather weak by this time and it took me about 15 minutes to turn the raft over and get aboard. During the struggle I lost my parachute silk blanket and a pencil I had been using to keep a log. I was in misery the rest of the night. It was then that I realized how much warmth the parachute had provided.

August 3 was a dreary day. Mist and thunderstorms were all around me. I didn't expect a rescue. I was convinced that I had drifted so far out of position that the rescue planes couldn't find me. I was, therefore, a surprised and happy man when, at 1100, I spotted three Navy *Catalina* flying boats approaching me. Two passed within half a mile—but failed to see me. The third passed directly overhead, and saw the sea marker dye I had spread on the water.

He dropped a smoke bomb to mark my position, called the other planes back, and all three circled the raft. The waves and swells were 10 feet high. It would have been a rough sea for any craft, let alone a flying boat.

Two of the planes lowered their retractable wing floats and made an attempt to land. Both pilots decided, upon closer observation of the waves, not to risk setting down on such a choppy sea. About that time I drifted into a rain squall and the rescue planes lost sight of me completely.

The third pilot, Lieutenant (j.g.) Hamblin, of Syracuse, N. Y., was a little more venturesome than the others. Although he could not see me, he decided that if one of them did not land on the water in that vicinity they would probably never find me again. He dropped his depth charges and about 800 gallons of gasoline to lighten the plane, and made a power-stall landing on the water. His starboard wing float hit a swell as he was landing and started to spin the plane to that side. Hamblin proved his flying ability when, quick as a cat, he hit the throttle on the starboard engine and kicked the rudder and wheel to port.

The lumbering *Catalina* straightened out and dropped into the sea. A wave broke over her and smashed the port gun blister, filling the after compartment with water. The plane remained afloat, however, and the crew bailed out the water as Hamblin taxied into the rain squall where I had disappeared.

After taxiing about two miles, they found me, gorging myself on the last of the rations that had been dropped to me August 1.

Despite the *Catalina's* precarious position on a heavy sea in enemy waters, I considered myself to be in the lap of luxury.

I stretched out on a dry bunk, pulled a warm blanket over me, drank some fresh water, and smoked a cigarette while I waited for Braun, one of the crewmen, to fix me something to eat. Practically the entire crew was seasick, including Braun. Nevertheless he fixed me two tumblers of grapefruit juice, a couple of cups of coffee, two big steaks and a large dish of peas.

5 YEARS AGO

FROM the May, 1930, issue of this magazine:

Results of the Guggenheim competition "seemed to show" that automatic leading edge slots, flaps, floating ailerons, long-stroke oleo landing gear and brakes "were worthy of incorporation in future aircraft designs."

An official report of the U. S. Navy stated preference for blank powder charges in operating seaplane catapult launching devices. Compressed air was less desirable, it was stated, because of variability of force.

A study of America's aviation future cited 84,000 students under 17 years of age who were studying aviation ground courses in the public schools.

"I soon learned that a plane actually would fly itself in the air and that it was easier to handle than a motor car," said E. L. Cord, automobile designer and manufacturer, in explaining why he had entered the aviation field.

Non-stop test flight of a Packard Diesel-powered plane was made from Detroit to Miami (1,200 miles) at a fuel cost of less than one cent a mile. Developing 225 h.p. at 1,950 r.p.m., the engine weighed 2.26 pounds per h.p.

Advertisement listed the Stinson *Junior*, a four-place cabin job that offered upholstered interior, dual control, electric self starter, cabin heater and wheel brakes. Top speed was 125 m.p.h., it cruised at 100. Price was $5,775.

The *Fleet*, a two-place, tandem, open-cockpit plane made by Consolidated, offered a top speed of 115 m.p.h., cruising speed of 95. Its price: $3,985.

Sportsmen in western states reported "takes" as high as $1,000 in coyote pelts (at $20 a pelt) on week-end lightplane hunting foravs.

South America's first airplane factory had just been completed in Santiago, Chile, by the Curtiss-Wright combination.

Ford's first four-engined plane was being rushed to completion for summer delivery. With 40 seats—convertible into 20 berths—the planes were to be used on several airlines for day and night service.

Flying a Barling NB-3 powered by a Lambert R-266 engine, D. S. Zimmerly had set a new world altitude record for lightplanes, 24,074 feet.

Model Builder Harold Denison, of Marion, Ind., accidentally discovered new helicopter design principles when the wing of his indoor pusher model came off and the fuselage (elevator-first) pointed straight upward and continued to fly with remarkable stability.

The sea was so rough that Hamblin decided not to risk a take-off at that time. He asked me if the water ever got any smoother out there, but I couldn't offer him much encouragement. Although the waves were running at least 10 feet high, it was the smoothest sea that I had observed since July 14.

We stayed on the water all afternoon and all night. The plane weathercocked into the wind and the swells constantly hit the wing floats from the side. The *Catalina* creaked and groaned like an old haunted house. The waves engulfed the bow of the plane and broke against the hull. It is a tribute to our aircraft engineers that such a slight structure as the hull of this airplane managed to withstand the pounding of a heavy, angry sea.

I was indescribably grateful for companionship and the courageous crewmen kept up a continual conversation with me, despite their seasickness.

At dawn of August 4 the navigator reported that we were 100 miles due south of the enemy air base at Kahaili on Bougainville. The waves were still 10 feet high, but Hamblin decided to attempt a take-off. He reasoned that, if we stayed on the water, the plane would break up in the heavy sea. And the possibility of Jap strafing was always a threat. He felt that he had a 50-50 chance of getting the plane airborne. If the take-off failed we would all be in the water that much sooner.

The take-off was successful! The cumbersome plane bounced off the top of one swell and spanked onto another, knocking some rivets out of the hull. It bounced into the air about ten knots slower than it should have been to be airborne but again Hamblin's skill saved our lives. No one but an expert pilot could have held that plane in the air without spinning.

Before taking off, Hamblin had lightened the plane by throwing every bit of loose gear overboard, saving just a very few rounds of ammunition for an emergency. He and his crew did an excellent job.

After we had been airborne about 10 minutes, three more *Catalinas* appeared and escorted us home. They had come out to search for their lost plane. I was taken to a field hospital on Florida Island, where I stayed for three days. Then, shaving off my beard, I started my long trip home.

How I obtained food and water is a story in itself.

When I landed on the sea, I had two days emergency rations with me. These included six small cans of pemmican, three chocolate bars, a small jar of malted milk tablets, some multiple vitamin tablets, some vitamin B1 tablets, and about three pints of water. I didn't eat a thing the first day. The second day I decided to ration my food to make it last at least 12 days. I allowed myself, therefore, four mouthfuls of water each day, half a chocolate bar, which I alternated every other day with one can of pemmican, two malted milk tablets, one multiple vitamin tablet, and one vitamin B1 tablet.

(As a result of my experience I suggest increased vitamin tablets, increased pemmican supplies, chewing gum, gun oil, pistol ammunition, and lemon crystals in the Navy-issue back packs. The lemon crystals can make the rain water more palatable. To make room for more equip-

Dependable Overhaul Service for More Than 17 Years

Spartan Aero Repair, located in the heart of the nation, has behind it a continuous, successful operating experience of more than seventeen years. As a division of the Spartan Aircratt Company—an established name in aviation manufacturing since 1928—Spartan Aero Repair has superior equipment and unlimited resources.

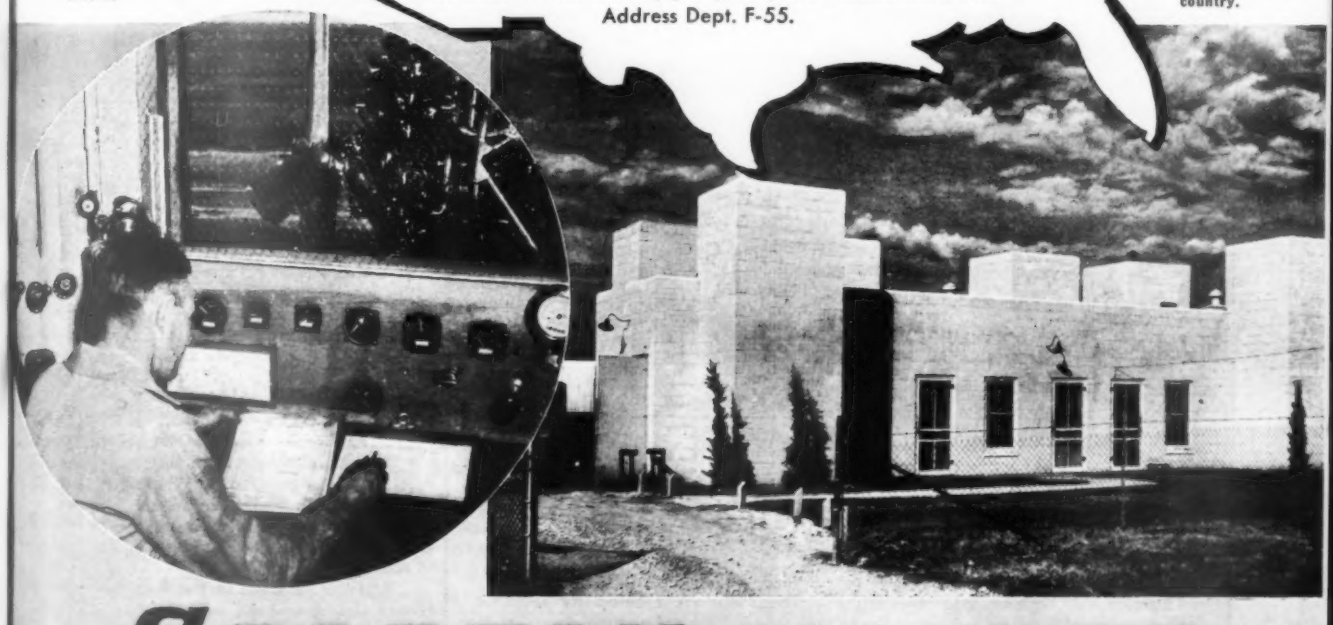
This 100% C.A.A. Approved repair station offers complete one-stop service to private owners and fleet operators. Machines of the latest designs enable S.A.R.'s staff of skilled mechanics to overhaul practically any make engine, airplane, propeller, instrument or radio. You can depend on Spartan to do any job efficiently, expertly, and at a reasonable cost.

WRITE NOW for catalog giving complete information. It's free.
Address Dept. F-55.

• (Above) Engine Overhaul Department.

• (Below) Exterior Engine Test House—one of the most modern in the country.

• (Below) One of the Test Recording Offices in Engine Test House.



SPARTAN AERO REPAIR

Division of SPARTAN AIRCRAFT COMPANY
TULSA, OKLA. Established 1928

ment I suggest the felt pad be eliminated. The pack could be made of two aluminum pans of the same size and shape. One pan could be filled with equipment and the other put over it for a cover. On a raft, one pan could be used for a rudder, the other lashed to the side for a keel.)

On the fourth morning I found an eight-inch fish in my sea anchor. I didn't know how it had gotten there, but that didn't worry me. I took it out and ate it raw. Throughout my drifting all attempts to wring moisture out of fish flesh failed.

On several occasions I speared fish with my sheath knife for that was the only way I could catch them. They refused to take the baited hooks I hung on lines on the side of the raft. Tiny minnows appeared under the raft during the first few days and stayed there until I was rescued. I made a seine out of mosquito netting, caught some of the minnows and swallowed them alive. It can be done if you are hungry enough.

I kept my .45 in fairly good condition by "field stripping" and cleaning it every day. At first I lubricated it with sea water. After the first week I greased it with fatty tissue from birds.

I shot nine birds during the 20 days, eight of them brown boobies—goose-like birds with a five-foot wing span. I skinned them, ate the liver, which was good, and drank the blood which I drained into my baling cup. The rest of the meat was not as palatable as the liver. I could not chew it but I cut it into very small pieces and swallowed it whole. I had to force it down but I knew that my body was getting nourishment.

When I shot the birds late in the afternoon, after they had been fishing all day, they had fish in their throats. These fish were predigested to some extent. The stomach juices had started to work on them and the meat was tender. I could pull it away from the bones, chew it, and swallow it. It tasted as though it had been partially cooked. It was perhaps the best thing I had to eat outside of my regular rations.

Before I ran out of fresh water I decided to experiment with drinking sea water. I tried to rig a distilling apparatus out of two canteens but it was unsuccessful. I tried using halazone tablets (they purify polluted water), but they have never purified sea water and they never will. I tried iodine in the water but that, of course, did not work. I didn't expect it to but I had nothing to lose by trying. I even tried putting sulfanilamide into the water. Not being a chemist, I thought that by some miracle it might precipitate the salt. It did not.

My malted milk tablets were in a small jar with a metal cap of the "screw-on" type. I rigged a valve on the cap that would open under pressure. Securing the bottle to my fish line, I lowered it into the water. The valve opened at about a 40-foot depth and admitted the water. I had two reasons for doing this. First of all I thought that the water at that depth, being under terrific pressure, might not have as much salt in the solution as the water at the surface and I might be able to drink it. Secondly, I thought that it might be colder than the water at the surface and that the bottle might sweat in the sun, like a pitcher of ice water, allowing me to lick the sweat off the bottle. Both assumptions were false and the experiment was entirely unsuccessful.

One day I saw a booby bird land on the water, dip its long neck under the surface and take a drink. It made me angry. I couldn't understand why the bird, which was only flesh and blood like myself, could drink sea water which I could not. I shot the bird, retrieved it quickly, and cut it open to trace the course of the water through its digestive system.

There wasn't a thing unusual about it. The water just went into the mouth, down the throat and into the stomach.

Around the intestines of the booby birds I found a handful of fat, which I used for greasing my gun. One day the thought occurred to me that I might grease my mouth with the fat and get sea water into my stomach without tasting the salt. I did that. I greased my mouth, swallowed some to grease my throat, esophagus, and stomach, and drank sea water until the grease was washed away. For five days I drank a pint of water each day without ill effects. On the night of August 2, when I capsized, I swallowed enough salt water to become nauseated. When I got back on the raft, I felt like vomiting. I got out some of the bird's fat and swallowed it. My stomach was settled immediately.

For six days I drank about one pint of sea water a day. This dangerous practice apparently had no ill effect on my body. My kidneys did become weak but as I recall the weakness appeared before I started drinking sea water. During the 21 days at sea I urinated about three times as much as I ever drank. The reason for this may be found in the fact that my body was never completely dry. I had only two bowel movements, both the first week.

On the night of July 26 it rained continuously all night. I laboriously filled my canteens. I caught the rain water in my sea anchor but couldn't pour it into the canteen because of the rough sea. Finally I solved the problem by putting the water in my mouth, then filling the canteen like a mother robin feeding its young. When the canteen was full, it was still raining and I caught another cup of water. I didn't want to waste it so I drank the rain water, thus ending the sea water experiment.

Though my rations were meager, I was able to keep my body in fairly good condition. I lost 20 pounds during the 20 days. I did suffer somewhat from pressure sores that developed on my elbows, my back and my buttocks. On the raft, my feet were wrinkled and white from constant immersion in the salt water. After I was rescued, my hands, feet and ankles began to swell. When the rescue plane hit the beach I was unable to walk. There was absolutely no feeling from the waist down.

After three days in the field hospital I was strong enough to start the journey homeward. My squadron was about four days ahead of me. They had left Guadalcanal and were already on their way home.

Thus ended an experience in which I literally drifted into the "valley of the shadow of death" and out again. END

THE HURRICANE'S EYE

THIS—the first known picture of a hurricane's "eye"—was recently photographed by a technician aboard a *Flying Fortress* high over the Key West area of Florida.

Cruising securely at 25,000 feet, far above the fury of the hurricane, the "eye" was suddenly noticed and recorded for scientific observation.

The "eye" is created by frontal winds and can be seen from the ground as well as the air, appearing as a break in the overcast. For a story of airmen who flew into the "eye" of a hurricane, see December FLYING, page 24.

YES SIR—THAT'S FINER FABRIC

• Airlines, Manufacturers, Pilots Maintenance-men—they all pronounce FLIGHTEX *Finer Fabric*. No wonder, each year more manufacturers buy more FLIGHTEX than any other airplane fabric.

World's Premier Airplane Fabric FLIGHTEX FABRIC

FLIGHTEX

FLIGHTEX FABRICS, INC. • 93 Worth Street, New York 13, N. Y.

Leading Manufacturers of Fabric and Tapes for the Aircraft Industry

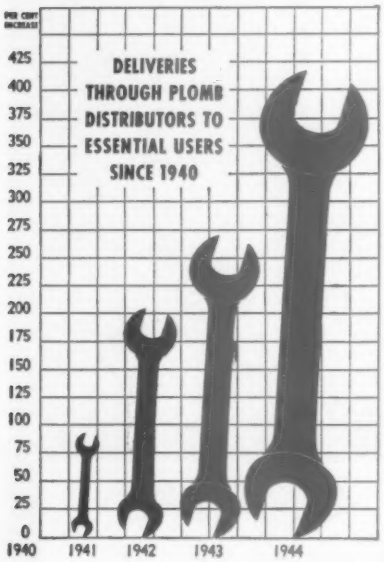
Export Representative—Aviquipo, Inc. 25 Beaver St., N. Y. Cable Address—"Aviquipo"

RESALE DISTRIBUTORS

AERONAUTICAL TRADING CO., Jamaica, N. Y.
AIR TRANSPORT EQUIPMENT, INC., Garden City, N. Y.
AVIATION SUPPLY CORP., Hapeville, Ga., Orlando, Fla., Charlotte, N. C., Nashville, Tenn.
BOB TRADER-AERO SUPPLY, Pittsburgh, Pa.
GENERAL AIRCRAFT SUPPLY CORP., Detroit, Mich.
INTER CITY AVIATION, INC., East Boston, Mass.
KARL ORT, York, Pa.
LEAVENS BROS. AIR SERVICE, LTD., Toronto, Canada.
W. B. MATTHEWS CO., Aircraft Div., San Antonio, Tex.
PACIFIC AIRMOTIVE, Burbank, Cal., Oakland, Cal.
SNYDER AIRCRAFT CORP., Chicago, Ill., Columbus, Ohio, Denver, Colo.
SUPPLY DIVISION, INC., Robertson, Mo., Memphis, Tenn.
THE AIRCRAFT STEEL & SUPPLY CO., Wichita & Kansas City, Kansas,
VAN DUSEN AIRCRAFT SUPPLIES, Minneapolis, Minn., Waterloo, Iowa, Cleveland, Ohio.

because PLOMB DISTRIBUTORS HAVE QUADRUPLED DELIVERIES TO ESSENTIAL INDUSTRIES DURING WARTIME.

Plomb distributors throughout the nation have done a magnificent job of getting Plomb Tools into the hands of the men who need them to speed war production and maintain other essential activities. Look at their record!



As compared to 1940 they delivered 86% more tools in 1941, 203% more tools in 1942, 264% more tools in 1943, and 416% more tools in 1944.

And in 1945 Plomb distributors will continue to carry large stocks to fill the needs of those men and industries eligible to buy Plomb wrenches, sockets, screwdrivers and other tools for essential work.

In addition —

Plomb factories were a major direct supplier of fine hand tools of special design to the armed services and essential war plants.—Plomb Tool Company, 2219 Santa Fe Ave., Los Angeles 54, California.

PLOMB
FINE HAND TOOLS

The Psychologist Picks a Pilot

(*Continued from page 55*)

to the earth, he had to learn to live in another, supra-world.

All of these—the unfamiliar element, the shrinking of time, the ego of the machine, the pattern of the strange and ruinous—combined to produce a kind of personality that is, even yet, unspecified.

Within the dozen divisions of the Navy's Bureau of Medicine and Surgery, a few psychologists were brought in to form an Aviation Psychology Section of the Division of Aviation Medicine. It was one of their jobs to oversee the selection, in terms of temperamental qualifications, of Naval aviators.

Luckily they did not have to start from scratch. The work had begun in 1939 under the Civil Aeronautics Authority with a first grant of $50,000. Naval aviators had been used in some of the tests for selection and training. By Pearl Harbor, the results of tests on more than 10,000 Naval aviators were on hand. By the middle of December, 1941, selection boards had been directed to use specified tests in selecting Naval aviators.

The first group of experimental workers in the field went at their task with whatever amateur knowledge of piloting they could pick up.

One interviewing officer—and it was then possible for any applicant to be turned down as the result of a single interview—believed no man could be a good pilot if he were a virgin at the age of 24. Another interviewing officer held that careful, painstaking persons such as stamp-collectors could not become effective fighting pilots; a third discarded all those interviewees who were left-handed "because I never knew a left-handed man who made a good aviator."

It was evident that there was no scientific procedure in the supervision of this very first step of a prospective pilot's career. Interviews proved to be dangerous no matter how scrupulously performed. Hunches that were originally taken lightly tended to become more and more fixed the longer the interviewer held his job. He tended to depend upon these hunches, on trick questions, and to weigh his quiz and the applicants' answers unduly. Certain cities turned down a huge proportion—nearly 40 per cent—on interviews alone.

The aviation psychologists, in line with current professional practice, were not content to rely on their hunches as to how pilots should be selected. Instead, some 30 promising tests were tried out. Of the 30, only three eventually proved to be of practical value in the pilot selective program. As they now stand, these are: (1) a specially designed intelligence test; (2) a test of mechanical comprehension—sometimes called a test of "barnyard physics," which includes problem choices dealing with the best way to brace a screen door, carry a bundle, or connect up a hot water heating system; (3) a biographical inventory, which in reality is not a test but a formalized interview designed to cover the applicants' background. Here, again, the scoring is not based on hunches but on the measured relationship between types of response and success in flight training.

The first civilian psychologist was given a commission as a Naval aviation psychologist early in 1941. Since that time possibly 500 men in this field have been working on psychological problems somewhere in the war effort—many of them out of uniform. The Navy has increased its aviation psychology staff today to 75 officers, all but a half dozen being on duty at the various training stations throughout the country. All of them have had at least two years in practical psychological work in industry, in addition to their academic degrees, before being commissioned.

Though the precise methods by which the speed and quality of selection are achieved must remain secret, the results have been highly satisfactory. More than 100,000 prospective Naval and Marine combat pilots have been given the standardized tests. Sampling of these groups, putting test performance against actual flight performance, brought out some interesting facts.

Out of 6,554 men given one of the tests, 54 per cent who scored in the lowest group later failed their flight training. Only nine per cent of those in the A group failed. Another experimental test showed failure in 65 per cent of the low group and only eight per cent in the top group.

There were failures among the original tests, too, to offset these successes. One test which looked at first to be an excellent one resulted in 26 per cent failures in the lowest class and 27 per cent in the A group. It was discarded.

What the test figures meant was a huge saving in time and, as a related matter, an even greater saving in money. It costs an estimated $27,000 to train a Naval aviator. The longer the ultimate failures go unnoticed or unweeded out of the general class, the more expensive and time-wasting it proves to be.

To get 1,000 finished Naval aviators, the Navy must start with 1,220 men out of the A group. The training itself will average about 229,000 hours. But they will have to take in 2,273 men out of the low group to procure the same thousand finished combat pilots, and the training time will be 294,000 hours. Regardless of the money involved—which is put at $28 an hour—the difference of 65,000 hours in the training of those groups will allow the Navy to put out 300 more finished pilots. That is the credit which the Navy gives their corps of H (S) psychologists—the Hospital Training Problems Specialists.

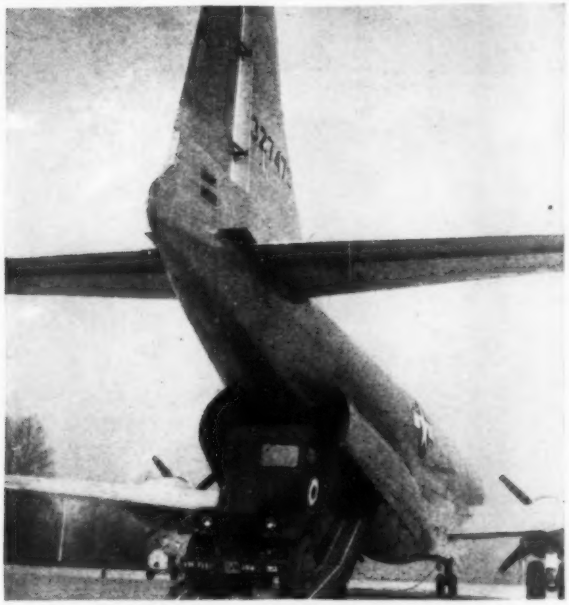
Though the development of new tests and the perfecting of old ones still goes on, that particular hurdle is considered pretty well topped. More than 90 per cent of the working time of Naval psychologists in the field is now devoted to training problems.

Part of the psychologists' trouble in training comes in making the pilots see

Acme Newspictures, Inc.

Nose close-up clearly shows the double-fuselage construction of the record-breaking C-97. With a length of 110 ft. 4 in. and a wingspread of over 141 ft., the ship exceeds all existing Army Air Force transports in range, payload, and size.

Press Association, Inc.



"Bite size" for the big plane is this 1½-ton truck, shown ascending the special ramp in the tail. Identical with the B-29 except for its huge double-decked fuselage, the C-97 can carry big trucks, light tanks, or 100 troops 2000 miles non-stop in less than 10 hours.

Press Association, Inc.

Big Brother

Cargo counterpart of the famed B-29 is the tremendous new Boeing C-97, unveiled in a burst of glory when it recently made a record-shattering flight from Seattle to Washington, D. C., averaging 383 miles an hour. Whether carrying a full load in its 10,000 feet of cargo space or 100 fully-equipped troops, one thing is certain — the C-97 is in a class by itself when it comes to helping our Army "git thar fustest with the mostest."

The responsibility for powering this mammoth ship lies in four Wright 2200-h.p. engines, and playing an important part in their steady, dependable performance are CECO carburetors. Of a highly specialized design, these carburetors are built to operate at pressures ranging from sea level to 40,000 feet altitudes . . . under external temperatures running from 60° below zero to 150° above.

Every man and woman at Chandler-Evans is proud that the precision and quality of the carburetors they make is such that they have been selected as integral parts of the power plants on this superb new plane.

CECO

CARBURETORS
FUEL PUMPS
PROTEK-PLUGS

CHANDLER-EVANS CORPORATION SOUTH MERIDEN, CONNECTICUT, U. S. A.

TWA Link Instructor Al Mutchler checks a "let-down" chart with student in Link Trainer.

Are You Afraid of the Dark?

This question is addressed to flyers, and it is no joke.

Put it another way—are you *instrument-trained*, or can you fly only "by the seat of the pants?"

There are vital reasons, of course, why *all* Air Force pilots, why *all* air line pilots are Link-trained in flying by instruments. Lives are saved by this training. Planes are saved. Time and money are saved. Schedules are kept. Military missions are carried through.

Consider the benefits to the *private flyer* of Link training. Instrument flying skill saves you many wasted hours, grounded at airports. And if you run into "weather," you know how to get safely through.

Before you take delivery of that new personal plane, why not check up on your own flying skill? Consult the Link Instructor at a good flying school in your neighborhood. He will be glad to explain the many and important benefits of Link training.

LINK

AVIATION DEVICES, INC.

BINGHAMTON, NEW YORK, U. S. A.

Link Manufacturing Company, Ltd., Gananoque, Ontario, Canada

Link Trainers, Aviation Sextants and other products contributing to the safety of flight

that they must be able to *do* and that it doesn't matter in most instances if they merely *know*. They devise ways to make studies practical exercises instead of mere lectures. They must get the student pilots to talk to them. "One of the most important things," reported an H (S) man from the field, "is to get these fellows talking to me. If they can talk themselves out they seem to be all right. It doesn't seem to make much difference whether I listen or not; the mere act of getting it off their chest is enough."

The tabulated conclusions of the psychologists in the field reveal some unusual sidelights. One is that the student pilot in one survey was much more affected by outside worries (a fight with his girl, a family death, world politics), than he was by worries in training, such as a solo flight or a test hop.

A second conclusion, now generally applied, was that the ratio of one to three in the number of hours of dual and solo time did not allow a sufficient amount of the former. Now the student combat pilots get much more dual time and save the waste of doing maneuvers wrong in their solo flights. When they were given a higher percentage of solo hours, they eventually learned by trial and error, but they lost precious time.

The psychologists like to emphasize the fact that they are not psychiatrists. "The difference," they say, "is that the psychiatrist deals with the abnormal. We deal with normal patients who are having normal difficulties. If we detect a paranoid, for example, he is immediately turned over to a psychiatrist."

What they have done is, first, to save the Navy time and money in selecting and training combat pilots. Second, they have put the whole operation and most of the elements concerned with it on a more impersonal and efficient basis. Where once only seven per cent of the would-be pilots were rejected on the basis of the tests, now 30 per cent are turned down.

So far the Navy has sent only six or seven qualified psychologists into the field though they have made hundreds of unofficial tests. Their orders put them aboard carriers in the South Pacific. There are no scientifically assembled data on combat warfare in the files but there is material which has been collected from reports and interviews. Some of this comes from returned Navy pilots. Some of it is the result of interviews with pilots of the Royal Air Force.

The greatest enemy that the man who flies to fight must face down is fear. It will attack him in various and insidious ways. There is the first fear of flying, the fear for the failure of the plane, the fear of the multiplicity of instruments and tactics, possibly the fear of engines or sound. There is the fear that the other fellow will not co-operate in the technique of combat flying which is the most necessarily co-operative venture in the knowledge of man.

Add to this the fears that are the possession of every human being, those that are hidden in personal history and crop up in foreign lands under unforeseen strain—and finally—the very real fear of death and dying, of pain and loss—and the psychologist's job assumes monster proportions.

Much of it can be smoothed by the automatic reactions of the pilot himself. If he is a well-assembled personality he will submerge most of these psychological hazards in his own way. But, as often happens, if he is maladjusted to the extent where his fears come through, he can be a mortal danger not only to himself but to his whole squadron.

The difficulty that the psychologist must face is that the combat pilot makes an inexpressibly hairbreadth fix between his physical reflexes and his mental attitude. In the situations he must conquer the 1,000th of a second is a lifetime. The loss of that delicate equilibrium means the loss of his life.

Coupled with this is the almost tangible awareness of death. It is useless to talk about there being "no atheists upstairs" or a pilot being unafraid. The point is that there are at least as many—if not more—atheists and realized cowards among the combat pilots as there are in any other walk of life. And they have an acute knowledge of the dangers they face.

One highly intelligent ace said he could not fly without first rationalizing this position to himself. He offered the opinion that all of his fellows did the same whether consciously or not.

The release from tension in combat comes in various ways. Most of it is by talking to a friend. Oddly, religion was reported to figure relatively little in conversations between combat pilots in the Solomons. There was a lack of the spiritual

U. S. Carrier Launches Navy's Grumman Hellcats

Grumman

AIRCRAFT ENGINEERING CORPORATION, Bethpage, L. I., N. Y.

Sets New Standards for **DEPENDABILITY** *and* **TWIN-ENGINE ECONOMY**

Let the Marines TELL YOU

Marines flew their first fleet of Commandos from San Diego to Honolulu in 13 hours . . . 2,660 miles nonstop across unbroken waters. And, each Commando flew at a gross weight of 50,000 lbs. In such gruelling operations as Midway, the Gilbert Islands, Tarawa and Saipan, Curtiss Commandos sped vital cargoes of troops and supplies—evacuated the wounded. Yet, in fifteen months, the Marines never lost a single Commando.

Under the hardest of pounding in this and the other theaters of war, Curtiss Commandos have piled up invaluable flight and operating experience which Curtiss engineers have used to full advantage in developing the Commando to its present high stage of perfection.

When the Commando again "dons its civvies" as the world's largest and fastest twin-engine, luxury transport, airlines will be offered a thoroughly proven airplane whose operating economy cannot be matched on short and medium range flights that account for over 90% of all domestic air travel.

Combining twin-engine economy with a seating capacity of 36-42 passengers and 526 cubic feet of cargo space, the Commando should earn the airline operator a maximum net profit from the anticipated postwar increase in both passenger and cargo business. Curtiss-Wright Corporation, Airplane Division, St. Louis, Mo.

Curtiss Commando

Passed the toughest tests ever given a Transport Plane

in talk-outs of the ready tents. There seemed to be a good deal of embarrassment and reluctance to talk about such things. It did not mean that it did not exist; it simply did not show.

All this was to the psychological good. There was, however, an unusual difference in the attitude of combat pilots from the last war. Where most of them had been violently superstitious in 1917-18, in 1942-43 they proved to have almost universal negatives.

There were other release mechanisms. Liquor, the harder the better, was often smuggled into the combat zone and used. But few combat pilots used it before a flight. Some of them eschewed it entirely. A rarer method was to end a tour of duty in a free-for-all fight in the dark in which the superior officers usually suffered most of the contusions.

Best and healthiest of all, say the psychologists, was the mail. This did wonders for the morale of the men who got good news; it depressed for days those who received bad tidings.

Good and bad food, of course, played a large part in the mental good health of the pilots. So did cold showers. These were among the first equipment installed in most cases. At Guadalcanal, two palm-tree posts and an oil-tin—as at Wake—formed a rejuvenator of high quality. Pin-up pictures helped but not as much as *Esquire* or motion picture publicity bureaus claim. It was a good imagination that could squeeze pleasure out of a photograph for more than a fortnight—tours in the forward combat areas lasted at least four weeks.

This time element has bothered the psychologists. Medical reports coming back from the fronts emphasized the fact that the pilots fell off amazingly in their efficiency with each succeeding tour. One doctor estimated that any man in the South Pacific on combat duty lost as much as 10 per cent of his fighting efficiency each month.

Recommendations have been made. One was that, in the case of three tours of duty, the first be made four weeks, the second three, and the third two—with correspondingly longer rest periods between each tour in the rear areas.

But the most important lack of all has been sought for by the psychologists for months. That is the boon of an *exact* time of relief for the fighting squadrons and pilots. If a man knows that he can go home, willy-nilly, on a certain date, he will fight longer and better for it. Often battle conditions made this impossible but plan-and-policy bodies have striven for the establishment of rigid rulings on this when possible.

Imaginary ailments used to fret the pilots—and their psychological *alter* egos in the States. No one, not even the most daring and bemedalled aces, was immune from this. The doctors often could not find anything wrong with their patients. Such things as a strained sacro-iliac (something no doctor can identify beyond doubt), salt-water sores, strained necks, stomach aches, were very common. They seemed to come in waves at various times. There were a few combat pilots who bluntly refused to fly certain missions. They felt they were unlucky on certain days or that they had "taken enough." There was one pilot who would hide in the jungle when his name was posted and had to be sent back to the rear areas eventually to be evacuated. He had a definite psychic fault. His nerve had completely broken.

Other pilots would be "Rover boys," flying around after saying that their engine was faulty, coming back to the base late. That way, they supposed, they fooled both their fellows on the flight and the ground officers.

The bombings did not seem to have any untoward effect, at least not any more than was expected.

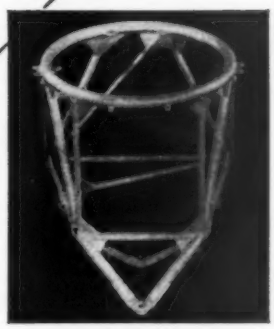
Sometimes the planes were thought to be jinxed. One *Wildcat* was shot up the first four times out. One bullet, according to its course through the fuselage, went through the pilot's head. No one could understand how it didn't. Everyone refused to fly Old 104 after that.

When their friends were killed, it didn't, so it seemed, make the difference that such a death would make in civilian life. There was, of course, the usual despondency and the lack of interest for a day or so—sometimes not even that. It was concluded that the continuing excitement of action and the lack of the general atmosphere, family condolences and black somber funeral trappings that usually accompanied a civilian death had a good deal to do with the common sense way it was treated in the field. Decorations were one cause of high or low pressure on the scale of morale. In the squadrons, each of the men knew exactly what the other had accomplished. The records were

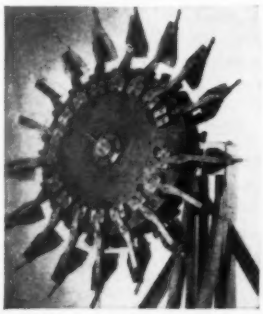
AIRPLANE AND PARTS CRAFTSMEN SINCE 1934

Skylark's craftsmanship on motor-mounts, bomb racks, control systems, wing fittings, and other vital airplane parts is helping American Air-Borne Craft to Victory today.

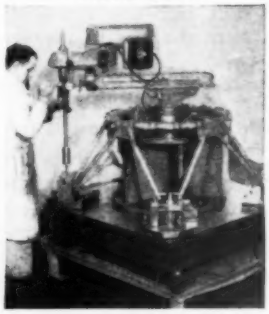
At the war's end, Skylark's skilled, experienced operators and precision facilities will be immediately available for peacetime production of airplane parts.



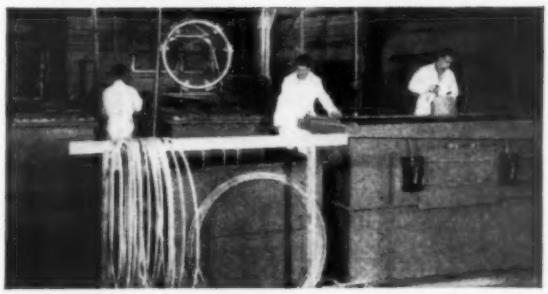
ENGINE MOUNT



WELD FIXTURE TOOL



ENGINE MOUNT MACHINING



PART OF THE LARGE PROCESSING DEPARTMENT WHERE THE ANODIZING, CADMIUM AND ZINC PLATING IS CARRIED ON BY SKILLED WORKERS

SKYLARK AIRPLANE & PARTS CRAFTSMEN SINCE 1934
Skylark Manufacturing Co., Inc., Venice, Calif.

NOTE: Look to Skycraft PRIVATE AIRPLANES FOR BETTER SAFER POSTWAR TRANSPORTATION

Write us now for information about warcraft parts or "Skycraft."

POST WAR AVIATION OPPORTUNITIES
Bulletin

VOLUME 1 NUMBER 7

Some Postwar Fields Anticipated for Radio Operators and Repairmen

The technical and practical experience acquired by air force radiomen should find ready peacetime employment. Depending on the type of skill, such men can continue work after the war in maintenance, inspection, installation or operation, according to information sources.

AIR LINES

Positions as radio telephone and telegraph operators are already available with the air lines. And postwar consolidation of domestic and international routes will provide additional positions, air line officials state. Radio teletype will be used on point-to-point and perhaps ground-to-aircraft in the future. Since the co-pilot acts as aerial radioman on domestic hops, lines use radiomen only as ground communicators within the continental limits. However, ocean hops require that planes carry radiomen.

REQUIREMENTS

Men seeking jobs with the air lines in these capacities should hold Federal Communications Commission licenses as radio telephone or telegraph operators second class. However, this license is fairly easy to obtain. The examinations are conducted by the F.C.C. and may be taken while still in the armed forces. As yet, examinations are held only in the States, but overseas personnel can get lists of approved textbook material to study as preparation. As an additional aid, lists of sample questions are available for study guidance.

Scene in one of United Air Lines' communications centers showing radio telephone operators working in touch with planes in flight.

PHYSICAL

Knowledge of air line radio procedure is not usually necessary. United Air Lines, for example, will hire second-class licensees who lack procedure. United also offers free home study courses designed to help beginners win promotions.

Physical requirements vary and the air lines attempt to hire veterans who might ordinarily be disqualified. In general, the ability to pass an ordinary insurance examination is sufficient to qualify.

OTHER FIELDS

Radio will play an increasingly important part in postwar transportation, both commercial and private. Two-way radio communication will undoubtedly be a feature of postwar private craft operation and may be required by law. Inspection and maintenance of such equipment will employ hundreds of radiomen, since successful radio performance can mean the difference between life and death to a flyer. Still others will find the postwar business world a ready field for the establishment of shops for home repair work, with television sets an additional source of income for men with a knowledge of radio mechanics. Government services will absorb a great many radio technicians, operators, radar operators, air traffic control specialists, etc.

RADAR

Though commercial use of radar is still very much in the planning stage, this medium will undoubtedly provide peacetime employment for radar personnel. Radar principles will be applied to instrument landing, automatic aircraft reporting systems, anti-collision devices, radio altimeters, etc.; all of which will be necessary if air lines are to operate commercial schedules independent of weather conditions.

The seventh in a series of bulletins designed to acquaint ground and flight personnel of the Army, Navy and Marine Air Corps with new developments in the field of commercial aviation. Union Oil Company does not believe the war is won, but we do think many members of the air forces are wondering what they will do when peace comes. We believe they will be interested to know of any opportunities which exist for them. Inquiries are welcome, and we will be glad to furnish information to interested personnel. Address—Aviation Dept., Union Oil Company, Room 700B, 617 W. Seventh Street, Los Angeles 14, California.

AVIATION DEPARTMENT
UNION OIL COMPANY
OF CALIFORNIA

76

there for inspection. The man himself was constant evidence on the ground and in the air. As a result, the awards were usually severely criticized; rarely acclaimed. Some of that could be laid to unfortunate awards. But none of the feeling was of long duration.

There appeared to be very little feeling toward the Japanese. Even when the enemy did not "play fair" there was no lasting resentment. There was, instead, a great curiosity about his tactics and appearance. The pilots sometimes circled a Japanese pilot to discover his looks and costume.

Getting lost was one of the most harrowing experiences that any combat pilot went through. One of them, in a letter to a doctor, described his feelings when he got back, after an interval of being alone in the sky.

"I bawled hell out of a mech," he related, "in a loud voice, even though he told me it wasn't his plane. On entering operations, I told a colonel I flew back alone with no instruments and never should have arrived if I flew by the book or something of the sort. I sure was mad and I felt as if I had to tell somebody. I had a hard time keeping myself from talking about it for too loud and long. . . ."

The rear areas did not always relieve the pilot tension. One commented: "I damned near lost my nerve back there. I relived every minute of danger I ever experienced and thought up new ones for the future. I got so nervous that I was tight and tense while riding a reconnaissance car."

This particular combat pilot worked it out of himself by a homely psychological remedy. He simply took up his plane and put it through a series of easy maneuvers, landing as limp and relaxed as a dead herring. END

'War-Baby' Airline

(*Continued from page 66*)

TWA took over two hangars at Washington National Airport in the summer of 1942 and complete overhaul and repair shops were installed. But in the field for the first 18 months after Pearl Harbor mechanics had to improvise. Most outlying fields didn't have even a nose hangar, spare parts, or adequate equipment.

Flight engineers carried a limited number of small spare parts in the plane. In emergencies they, too, improvised. The piston and cylinder assembly on a G-105A Wright *Whirlwind* burned out in flight over South America. Landing, Engineer Rayburn Darst could get no substitute parts. He therefore took the cylinder of a G-100 engine from an old Douglas *Bolo*, sawed off the push-rod housings, used shorter push-rods, and test-hopped the result with the pilot. The flight, which would have been delayed a week or 10 days if repair parts had been flown in, was able to continue in less than 14 hours.

A British RAF flyer landed on an African beach with a wrecked condenser. No spares were available. A TWA mechanic, C. W. McKenny, fashioned one from a sardine can.

Modification was—and still is—a major problem in transocean operations. Engineering changes on *Skymasters* before an ocean flight currently total 401 on a plane just off the factory line. So well did the ICD shops do this type of work that the Air Transport Command in the suumer of 1942 assigned to TWA the task of co-ordinating all *Skymaster* engineering changes. More recently ATC has taken over the co-ordinating work, with TWA acting in an advisory capacity.

TWA engineers and mechanics in Washington also developed, among other things, a nose heater for the cockpit while a plane is on the ground. By blowing heat between the windshields it keeps them from icing and keeps the instrument panel warm. Complete engine overhaul was extended from 650 hours to 750 and today—an all-time high—is carried out only at the end of 975 hours. Similarily, plans are to do a major overhaul at 8,000 hours instead of the current 5,000.

By the middle of 1944, TWA was getting an unprecedented utilization from its equipment: 12 hr. 47 min. per airplane per day in July. That represented a 50 per cent improvement over January of the same year and a 30 per cent improvement over April. Although utilization dropped somewhat during the winter months it is still comparable with that of domestic airlines.

When ICD started few of the crews were trained in celestial navigation. Courses were started in Washington by Peter Redpath, a TWA navigator with more than a decade of service. So rapidly did the training go forward that it was possible to curtail the program more than a year ago. Pilot training to bring recruits up to ICD standards checked out enough men in the first 10 months of operations to meet immediate demands. Airline training for the less experienced flyers was under the direction of Joseph Carr. Two twin-engined Cessnas and a Boeing 247D were used for actual flight training, at the successful completion of which the candidate was sent with experienced crews on transocean check trips before qualifying as a co-pilot.

TWA-ICD formed a medical department under Dr. R. Bretney Miller to train a staff in tropical and subarctic diseases. Most frequent complaint of those flying northern routes was the common cold. Regardless of routes, fatigue has proved an occupational disease for all crews.

An intensive preventive campaign was begun. About 30,000 innoculations were given to flight and ground crews in the first three years of operation. Careful detective work to track down insanitary eating places, Army mosquito control work, and constant checks on personnel has kept the score on dysentery and malaria to a minimum. Only seven cases of amoebic and five of bacillary dysentery have been reported since the program began. No cases of malaria have been reported since October, 1943, as contrasted with 14 cases up to that time.

Preventive measures against colds have been particularly successful. All crews are examined before taking off and anyone with a cold is grounded. Incidentally, Dr. Miller reports that, speaking generally, crews flying tropical routes are healthier than those flying in the north.

All work in fighting fatigue has been carried out in close co-operation with the ATC and AAF medical units. Under Army regulations consecutive flying hours are restricted to 12 for two-pilot crews, 18 for three-pilot crews. Layover crews have been stationed on the routes to keep these quotas. Total flying hours are also limited to 300 in any 90-day period. On long flights a schedule of feeding the crew at two-hour intervals, rotating rest periods and more extensive use of oxygen have proved helpful.

Names of notables who have flown the TWA Intercontinental Division read like an international "Who's Who," and include President and Mrs. Roosevelt, Generals Marshall, Arnold and Eisenhower, Admirals King and Tower, Mme. Chiang Kai-Shek, President Vargas of Brazil, King Peter of Yugoslavia, Queen Wilhelmina of Holland.

While most of the trips—to quote one pilot—are "like driving to your office in the morning," there has been a sprinkling of unusual happenings. In November, 1942, one of the *Stratoliners*, captained by S. T. Stanton and flying westbound from

MARKER BEACON

DEVELOPED by the CAA, a new outer marker beacon has been successfully tested at the Indianapolis airport. A standard searchlight of 5,000,000 candlepower mounted on a platform about two miles from the airport swings a "finger of light" from a vertical position downward to one almost horizontal to point out the position of the airport runway in poor flight conditions.

The new beacon penetrates higher through ground haze or low mist than any other airport light. Moving up and down at the rate of 23 complete cycles per minute, it is a special aid to aircraft without radio or with disabled radio equipment.

For Cleaning and Finishing Propeller Blades • Dies • Engine and Other Metal Aircraft Parts

A size and model for every finishing job.

Constant high wheel speed and ball-bearing mounted straight and angle spindles combine in this MALL Grinder to provide swifter, smoother wheel action, longer tool life, fewer rejects, and a faster finishing rate.

The working tools are light in weight, easy to handle and quickly interchangeable. The heavy duty motor swivels to make power available in any direction. The unit can be rolled right up to the work saving steps and material handling. The high overall efficiency and wide range of applications of this equipment will quickly repay its original cost.

Mall
REG. U.S. PAT. OFF.

FLEXIBLE SHAFTS

For Remote Control and Power Transmission

Dependable in EVERY Detail

Especially Engineered For Many Aircraft Controls and Drives to Your Specifications.

Available with Metallic or Plastic Covered Housings in any desired length or type with or without fittings.

Behind every MALL Remote Control Flexible Shaft is over 24 years of designing, engineering and manufacturing experience that assures correctness of design and high reliability. It is probable that from our past experience we can furnish the perfect combination that will solve your problem, as well as save time and reduce costs. Write TODAY for FREE booklet "FLEXIBLE SHAFTING FOR REMOTE CONTROLS."

Ask your Supplier or write for literature and prices.

MALL TOOL COMPANY, 7771 So. Chicago Ave., Chicago 19, Ill.

Mall REG. U.S. PAT. OFF. **PORTABLE POWER TOOLS**

Iceland under a low overcast, caught 20-mm. shell fire in its tail assembly from an eastbound friendly freighter whose gun crew had mistaken it for a Focke-Wulf *Kurier*. The trip was completed without further incident.

Once a TWA-ICD radio operator sent out the signal of the day—only to get a correction on the same wave length from a German submarine.

Two planes have disappeared in mid-flight under flying conditions so favorable that it is believed they were brought down by enemy submarine gunfire. One of the few accidents in the *Stratoliner* was caused at Natal by an unlighted pile of dirt. Capt. Bruce Pettigrew, the pilot, pulled up in time to avoid a catastrophe although one landing wheel was sheared off. He landed so smoothly that passengers were unaware of trouble.

Most of the men on the trip from Kansas City to Washington in February, 1942, during the earliest days of the ICD, are now top executives in that organization or have been drafted into top jobs in its war parent, the Air Transport Command. Otis Bryan is ICD's top kick as vice president War Projects of TWA. Clifford Mutchler was manager until January when Hal Blackburn replaced him. Royal Jordan is a foreign representative, J. H. Poole supervisor of maintenance, Bob Loomis supervisor of engineering, R. Bretney Miller chief of the medical staff. Larry Fritz is a brigadier general in ATC, D. L. Mesker commander of a Pacific wing of NATS, Don Duensing an enlisted man in the Army. Sam Mead has returned to TWA in Kansas City as communications engineer.

The other heroes of the early days of ICD, the *Stratoliners*, were retired this spring from ICD but not from duty, after hanging up a record of nearly 50,000 hours of flight time without a fatal accident. Their G-105A Wright *Whirlwinds* were tired, not to mention certain structural fatigues. The engines are being replaced by G-205A's, they are getting *Flying Fortress* wings and tail surfaces and their interiors are being revamped for 38 passengers.

With this experience as a backlog, TWA officials are on record at the Civil Aeronautics Board as eager to continue operations over their Atlantic routes and to extend them round the world. END

Plane Paddlers

(*Continued from page* 58)

there has been a lack of volunteers and the Navy has been training pilots with newly-won wings for the jobs. Southerland attributes the lack of enthusiasm to failure to understand the LSO's vital importance in carrier operations, and to the highly specialized nature of the work. Formerly, an LSO was too highly specialized to be given a shot at combat flying. Now the Navy is gearing up its program so enough signal officers will be trained that a system of rotation to other duties, after an unspecified length of time, can be instituted.

The attrition rate among the student LSO's is unusually high—around 50 per cent. A new class of 30 men is started every month. About 15 are graduated and of them only three to five become LSO's immediately. The others are rated as assistants and must work under the direction of qualified LSO's on carriers until they have become proficient enough to check out and drop the "assistant" from their titles.

LSO training starts at the Naval Air Station at Jacksonville, Fla. The men divide into groups of 10 and alternately fly and observe *Dauntless* landings a couple of two-hour periods a day. This training in making and watching landings on a runway marked to simulate a carrier deck lasts a month and gives the students a chance to view both sides of the carrier landing problem. Next they spend two months with an Operational Training Unit (OTU) studying with a regular LSO. By this time the students have learned the 13 basic landing signals so well they have become almost reflexes. They have watched so many thousands of landings that they are already experts by land-lubber standards.

But this training is all at daytime. Next comes a week at Vero Beach, Fla., watching night landings, and then a month with an OTU operating different type airplanes. The students then make and observe about 1,000 landings on the *Wolverine* or the *Sable*, training carriers off Naval Air Station, Glenview, Ill. At last the top 15 to 20 per cent are considered qualified for squadrons or carriers. Others are assigned as assist-

AERIAL ARTILLERY HELPS BLAST THE 3RD LARGEST CITY IN THE WORLD!

TOKYO RAIDED BY CARRIER-BASED NAVY PLANES USING BOMBS AND CANNON!

Down . . . down . . . a screaming power dive . . . straight toward the heart of sprawling Tokyo. An airport—there's the target! Watch our Helldiver's bombs dig sudden craters in the runway. Now watch those lined-up enemy planes. Sitting ducks . . . until our high-explosive cannon shell blast and burn them completely!

EVERY American must have cheered upon hearing the news of the Navy's daring, all-out raid on the capitol of Japan. At Oldsmobile, we were particularly thrilled, because we have built so many thousands of the same type automatic aircraft cannon fired by Helldivers and other Navy planes taking part in the action. *Fire-Power is our business* . . . and successes like that at Tokyo are a flaming incentive to keep the Fire-Power coming, to turn out cannon and rockets and heavy caliber shell in the volume required to deliver the final knock-out blow!

BUY BONDS . . . TO KEEP 'EM FIRING!

OLDSMOBILE DIVISION OF GENERAL MOTORS

FIRE-POWER IS OUR BUSINESS

ants on carriers and work under observation until qualified.

Top-ranking Navy men say few have more exacting and responsible jobs in the fleet than the LSO. Mistakes can be fatal to many persons. Lack of co-operation with him can foul up deck operations, slow down a whole task force's landing operations and bring reprimands to every one from the admiral down.

McCampbell cited one result of failure to heed an LSO's signal. It was last June 20, just after the first battle of the Philippines, when pilots were returning to their carriers at dusk. A wounded and confused pilot crashed his shot-up plane on deck. A second pilot, disregarding the LSO's wave-off, landed and careened into the wreckage, killing several men including the Air Officer, third in command of the carrier. Other landings were delayed as a result, endangering those pilots who were low on fuel.

Speed in clearing the landing area aboard ship is most essential and requires exacting teamwork from the plane handlers and the LSO. A good signal officer with an experienced deck crew should land planes with a frequency unheard of in civil aviation but vitally important on a carrier, whose planes seldom carry more than a one-hour fuel reserve.

The LSO's job is particularly ticklish when battle-damaged planes make their landing approaches. He must make a quick assessment of the plane's airworthiness and the probable condition of the pilot, and then decide instantly whether a bad crash-landing is preferable to sending the pilot around for another attempt. Navy policy is always to take any necessary risks of damage to the ship or ship's personnel rather than abandon a landing attempt. Saving the pilot and crew of the aircraft is paramount.

Commander McCampbell doesn't think it strange that there is a shortage of volunteers for the LSO posts. "Naturally, during wartime," he said, "pilots want combat assignments, and the LSO is too important to trust on fighting missions. But during peacetime it is the most desirable job in the fleet for a junior officer. It's one sure way of getting a ship assignment rather than a shore job. You get plenty of flying time and you're in a position of authority."

The job is one that requires steadiness under duress and the ability to act with the speed of thought. It is one of the most nerve-racking tasks on a carrier. Although a few non-flying LSO's have been trained, the job usually calls for a man who is not only an excellent pilot himself but is a good critic of the ability of others. While no examination has been devised as a means of selecting officers for LSO training, the Navy taps some of its best flying school graduates and grades them according to their adaptation to LSO requirements.

All carriers have at least two signal officers—one of the purposes of the expanded training program is to provide three for each "fighting lady." Ordinarily two LSO's are permanently assigned to each carrier and one to each air group. The latter remains with his group whether it is ashore or afloat. Because the technique of making consistently good carrier landings is easily lost, "bounce drills"—practice landings—are regularly held, even ashore. And the air group LSO is on hand to direct them, for his skill, too, diminishes with disuse.

There was one occasion, though, when a shipload of planes was landed successfully by a seaman who had never handled the paddles before. He was the "talker," the enlisted man who stands with the LSO and transmits his instructions to primary flight control by telephone. This carrier had loaned one of its two LSO's to another ship. During a moment of excitement the remaining LSO had missed the net and gone overboard when he jumped to avoid being hit. His talker, who had witnessed hundreds of landings, carried on without a hitch and landed the planes safely.

Lacking pilot volunteers in the early days of the war, the Navy Department trained some non-flying officers as LSO's. Though most of them performed their jobs well, the program was soon abandoned because pilots were loath to trust the judgment of non-pilots. Some of them did manage to win the confidence of their pilots, however, for at least three are still flagging them in. And McCampbell says one whom he knew was among the best of all the LSO's with whom he has worked.

Night landings are probably the most hazardous for the LSO. He assumes his regular position at the stern of the ship and replaces his paddles with neon wands two or three feet long, or with wands illuminated by flashlight bulbs. He can determine the attitude of the landing planes only by the lights showing on the wings. Each plane has tricolored lights on the leading edge—red, amber and green. The LSO can tell by the color of the lights visible to him whether the plane is in the proper attitude for landing. Most common of pilot errors at night are over-correction of signals and slowness in carrying them out. Coming in flat and too fast is as bad as settling too low. The first can strain the arresting gear and the latter is hard on the flight deck and the nose of the plane.

Recently a new type of illumination has been developed to make the LSO more easily visible to pilots. His uniforms and paddles are coated with material that is luminous under ultra-violet ray, bringing the officer himself as well as his wands into sharp relief.

To add to the difficulties of the LSO there is the nasty weather to contend with. Cold is not a problem in the south Pacific area but, take it from McCampbell, even an electric suit affords little relief from the 30 knot-per-hour winds of the frosty north Atlantic. But to most LSO's weather is only a small consideration, for on them regularly depends the very lives of the men for whom the aircraft carrier exists—the combat pilots. END

FLYING

Just in case we get any crazy ideas about tryin' to fix it!

Looking Ahead with LEAR

The new Voyager 125, Stinson's contribution toward America's postwar private flying — 4 place with a cruising speed of 115 mph.

What is America's private plane going to look like? This is Stinson's answer—a sleek, serviceable successor to the rugged, hard-working "Flying Jeep" used by the Army as an observation and ambulance plane.

As with other postwar planes, the radio in this Stinson Voyager is a Lear Radio. For Stinson knows from experience that this is a dependable radio—a radio made for airmen by airmen.

This is what Stinson has to say about Lear Radios:

"In the past years we have been installing a large number of Lear Radios in our Reliant and Voyager planes and have always found them to be satisfactory in every respect."

Lear has been making outstandingly fine radio instruments and direction-finding equipment since 1930. And these instruments have won a reputation for their light weight, sensitivity and complete dependability.

LEAR, INCORPORATED — Radio Division: Grand Rapids 2, Michigan · Aircraft Radio Sales: 1860 Broadway, New York 23, New York · West Coast Subsidiary: Lear, Inc. of Calif., 1010 N. Highland Ave., Los Angeles 38, Calif.

Formerly Lear Avia, Inc.

Lear INCORPORATED

6 ways to be your own boss!

NOW, more than ever before, is the **right** time to start a small profitable business of your own ... or train yourself for a practical money-making trade in which you can be **independent.** TODAY take your first step, without cost or obligation. Just mail coupon—and by return mail you will get full information on the courses listed here.

watch and clock repairing

LEARN AT HOME... IN YOUR SPARE TIME. Prepare for a happy future of prosperity, security ... and get a big-pay job now. You can **EARN WHILE YOU LEARN.** Excellent field for part-time work at home. **PRACTICAL COURSE IN HOROLOGY** Thorough self-instruction training in American & Swiss watches, clocks. Special sections on alarm clock repairs. Interesting LEARN-BY-DOING instruction method. Learn **QUICKLY,** easily. No previous experience necessary. WATCHMAKING IS BASIC TRAINING FOR AIRCRAFT INSTRUMENT WORK and other scientific precision jobs.

Amazing Low Price! Money-Back Guarantee! Get into this fast-growing field NOW... big opportunity. Mail coupon below for **FREE** information. No obligation.

locksmithing and key making

Practical Up-To-Date Course How to pick locks, de-code, make master-keys, repair, install, service, etc. New self-instruction lessons for every handy man, home-owner, carpenter, mechanic, service station, fix-it shop, hardware dealer or gunsmith.

35 Easy Illustrated Lessons Low Price! Satisfaction guaranteed or your money back. Write now... no obligation!

practical RADIO servicing

SELF-INSTRUCTION COURSE Teaches you the **practical** side of radio ... repair, adjustment, operation, alteration, trouble-shooting. No previous knowledge is necessary. Large clear illustrations, diagrams, charts, etc. **Interesting STEADY WORK** Set up a radio repair shop of your own—or prepare for booming industrial electronics. This useful, how-to-do-it course brings you all the fundamentals, including mathematics, review questions, problems, answers. Strictly up-to-date. Low price. Send Coupon below for information!

MAIL ORDER BUSINESS

Your Big Opportunity! 24-lesson course on proved, tested, up-to-date **profitable** methods. Amazing treasure-house of the best mail order plans & practices. How to start your mail order business on a small one-man scale... how to keep it growing more and more profitable month after month. Money-making FACTS! Mail coupon below for full details.

Practical REFRIGERATION

BRAND NEW STREAMLINED COURSE for quick training. Authoritative step-by-step instruction on servicing household refrigerators ... how to install, operate, repair. Easy-to-follow illustrated directions on trouble-shooting, parts replacement, testing. Covers *quick-freeze* units, lockers, water coolers, freon, air-conditioning systems, etc. Unusual low price. Free details—mail coupon.

AUTO mechanics

Let this **practical, low-priced** course get you started in the auto repair trade. Good mechanics make big money NOW... and have a *great future!* Self-training lessons show you exactly what to do and **how to do it.** Teaches servicing on all makes of cars ... adjustments, tune-ups, etc. Clearly written and illustrated by expert engineers. Satisfaction or refund. FREE details.

Nelson Co. Dept. 8E17 321 S. Wabash Ave., Chicago 4, Ill.

WRITE FOR COMPLETE DETAILS ON ANY OF THESE COURSES. Just send Coupon for World-Famous Copyrighted Success-Catalog—IT'S FREE! Write today.

FREE details ... mail coupon!

Nelson Co. Dept 8E17 321 S. Wabash Ave., Chicago 4, Ill.

Please send me—FREE and without obligation—illustrated Success-Catalog containing information about the course (or courses) I have checked below. No salesman will call.

☐ Watch and Clock Repairing ☐ Practical Radio Servicing
☐ Locksmithing, Key Making ☐ Mail Order Business.
☐ Practical Refrigeration ☐ Auto Mechanics

NAME .....

ADDRESS .....

CITY ..... STATE .....

The Case for the Hungry Pilots

(*Continued from page* 51)

nearest eating place. . . ."

"No," Audrey said with finality, "at least, not yet."

By noon, the weather cleared a little. Not enough to leave for Cleveland, a control airport which has a good restaurant, but good enough for non-control airports. I set a course for Mansfield, O., about 75 mile on our way toward home.

"I've heard," I said, "that there's a good restaurant right on the field."

And Mansfield Airport did have an excellent restaurant next door.

"Thank God," gasped Audrey fervently, like a cast-away who had just sighted land, "Food at last."

We hadn't eaten, remember, for nearly two days, except for a hot dog and a bottle of milk apiece.

"Sorry," the waitress announced. "You can't eat—not until the cadets and instructors finish."

"How long," I groaned, "will that be?"

"A couple of hours," she replied, then added purely as an afterthought:

"But usually there's nothing left."

We stumbled out of the place. But my life companion wouldn't hear of hiring a cab to the nearest eating place.

"Maybe we can find an airport with an eating place nearer home," she said.

The map showed Wooster, O., only 40 miles away. I recalled a little eating place near the airport where I got breakfast once. We took off again.

"Nope," said the lady clearance officer at Wooster, "that place is no more."

Then she added magnanimously:

"If I had a car, I'd take you to town."

"A taxi. . . .?" I suggested.

"No," she replied. "Hard to get a cab to come out here."

The candy machine yielded one lone candy bar, then quit. Audrey and I split the bar and took off. Now Akron Airport, right on our way, has a restaurant—but we didn't dare land at Akron. Akron was on instruments.

Canned salmon tastes like steak after the rigors of a foodless cross-country jaunt.

"Maybe," suggested Audrey, "we could have a forced landing. Maybe we could land near a farmhouse."

The idea didn't sound good, and we flew on. Eventually we arrived home. The family cupboard yielded a can of salmon that tasted better than beefsteak.

A week later, we flew cross country again, this time fortified with a bag of peaches.

"I'm certainly glad we brought along something to eat," observed Audrey, reaching into the bag.

She drew out a peach with a big rotten spot and unthinkingly tossed it out the open window. It hit the tail, knocked a hole into the fabric—and we had an emergency repair job at our next landing.

I blame private flying's No. 1 problem for it all. END

Why, oh why, must airport snack bars tempt the hungry pilot with window signs of luscious ham and eggs or plate lunches—and then serve the lowly hot dog on a weary bun as a pacifier?

. . . RADIO TO KEEP YOU FLYING SAFELY

Radio to keep you flying safely is going to be one of the prime requisites in that postwar plane of yours. Hallicrafters, busy now with the production of all kinds of communication equipment for war, will have interesting plans for peace time aviation radio. When in days to come the airport operator inquires "Number please?" here's hoping you'll be able to answer her on the Skyfone—marked with the name of Hallicrafters, a symbol of radio sensitivity, selectivity, and dependability under all conditions.

Skyfone

BUY A WAR BOND TODAY!

by hallicrafters

THE HALLICRAFTERS COMPANY, MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 16, U.S.A.

Report from Washington

(Continued from page 64)

his leg from North Platte to Omaha, and then flew on to Chicago without rest when his relief pilot missed their rendevous. It made big, black headlines and —more important—it saved the airmail, threatened with starvation at the time from lack of a Congressional appropriation. . . .

Jack's death a few weeks ago made no big black headlines. Few of his old friends even knew that he went to South America in 1941 for the Defense Supply Corp. to add to his 2,500,000-mile, 22,000-hour record as a pilot—an all-time U. S. high when the war began. Fewer still were aware that, returning to the States a failure as a pilot, he did a brief trick at CAA and then, failing a second time, went to Buchanan, Mich., his home town, some six months before his death. It wasn't that his friends forgot him. Many of them looked him up and tried to help. But he was beyond help—and failure seldom makes the headlines. . . . Toward the end, even his successes went unreported. We recall one that was typical. An eight-year-old we know met a lot of crack pilots, including Knight. Jack was a sucker for kids, and they for him—and this one recognized that he was one of them. So now when a transport roars over the eight-year-old's house close enough for him to hear, he always says the same thing to his buddies. "That's Knight buzzing us," he says. . . . Maybe that was Jack's greatest weakness—and his greatest strength. He was so sure that aviation belonged to youth that he tried to stay young beyond his time.

Airways Engineering Consultants

Knight's death came as a particularly severe blow to a new organization in Washington—Airways Engineering Consultants, Inc. It was hoped that Jack's health would permit him to add his wide experience to the staff of the organization. . . . It's an impressive staff, indeed, with Lieut. Col. Harold E. Hartney in the lead-off position. The colonel is probably best known for his services as commanding officer of the first pursuit group in World War I and as acting chief of operations under Gen. "Billy" Mitchell. He has also acted as technical advisor to the air safety committee of the United States Senate and was one of the founders of the National Aeronautical Association. . . . Other Airways Engineering experts include Lieut. Everard L. Stuhrman, former chief of communications for American Export Airlines—he designed and constructed all radio and meteorological stations in South America for the Rubber Development Corporation when he was chief of radio facilities for RFC; Fred W. Tuemmler, former member of the department of city planning, New York City, and director of planning, Maryland national capitol park and planning commission; John Sloan, architect of the Graybar, Channin, and Pershing Square buildings, New York; Robert S. Walter, former assistant to the Secretary of the Interior, and Henry M. Henion, former chief of construction, airport construction program, Rubber Development Corporation. . . . Purpose of the new organization is to act as consultants in the forecasting of probable cargo and passenger traffic, to select airport sites, plan field layouts and terminal buildings, and offer guidance in the zoning and legal aspects of airport operation. . . . It will headquarter at 1621 Connecticut avenue, Washington.

Farewell Again

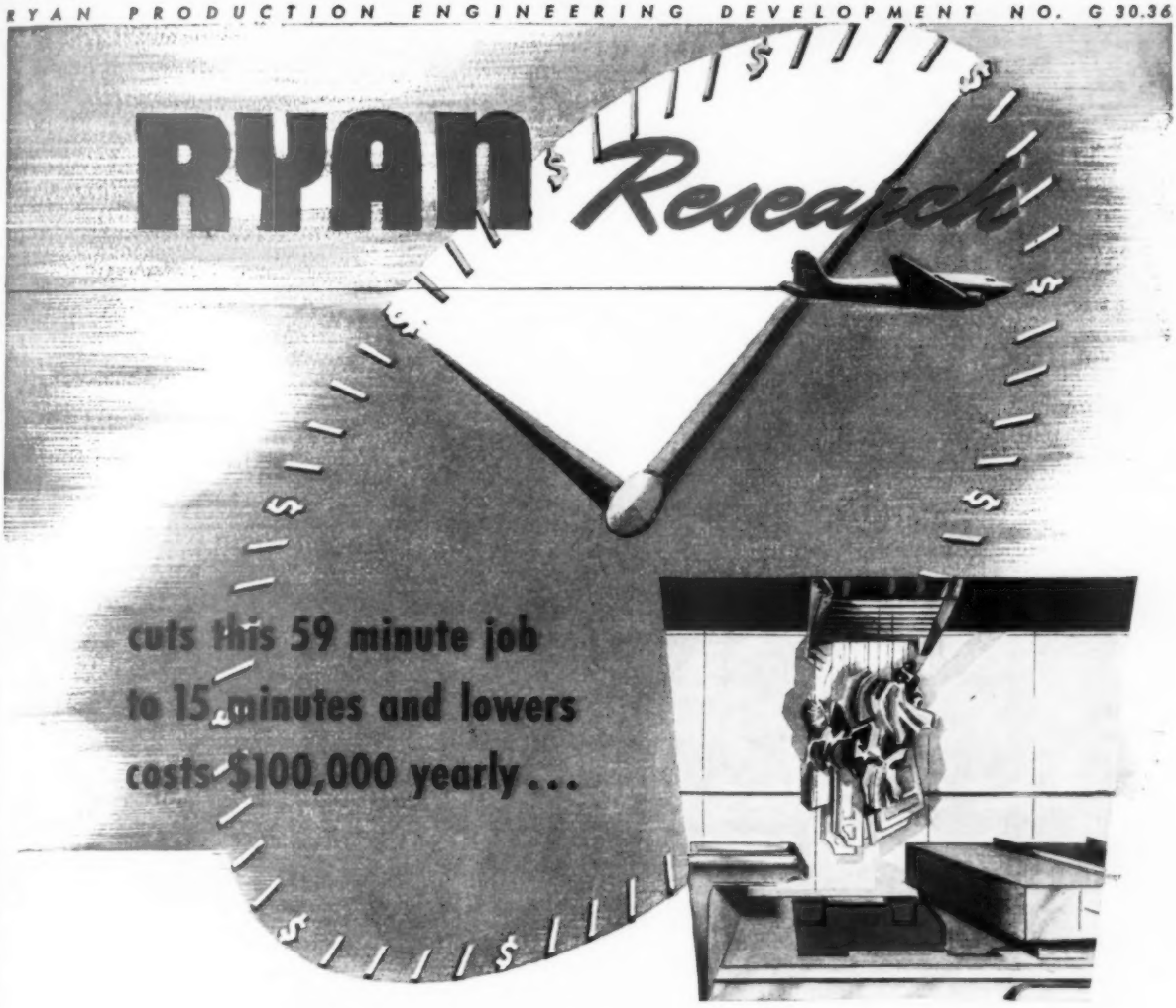
The Aircraft Owners and Pilots Association tells us of letters from their members which, added to "Farewell to Superman" in the March issue of FLYING, make highly exciting reading. Without exception the AOPA correspondents favor letting family physicians do the examinations for CAA medicals and are equally emphatic in condemning old-style requirements for physical fitness to fly. . . . Most interesting were comments by the men who know physical requirements best—the doctors themselves. "As a pilot and a practicing physician," writes one, "I heartily endorse your (AOPA) efforts in doing away with yearly pilots' physical examinations. Absolutely no benefit can be demonstrated whereby the pilot safety factor is increased by their use." A mid-west M.D., describing his annual examination in detail, concludes: "Medically speaking, the test was, of course, a farce. His (the examiner's) checks consisted of listening to my heart with a stethoscope, looking in my left ear, asking what field I did my flying from, and did I have any false teeth. Total time he spent with me was less than five minutes. The charge, of course, was $6." . . . "Let's get rid of these conditions and give aviation a chance to grow as it should," says a third doctor, and a fourth reports "I have talked with pilots, CAA personnel, and physicians who are pilots and I can find *none* who can defend the physical tests. Let's remove these senseless medical requirements so that many more thousands will take up flying, giving the CAA medical and inspection departments legitimate need for additional help. . . . Sounds kind of unanimous.

. . . And Again

Lay comments condemning the medical regulations may have been less carefully worded, but they were more caustic and often amusing. "To put it bluntly," says a mid-western lawyer writing to AOPA, "it's just too damn much trouble to arrange for this examination each year, particularly when the appointment must be made with one particular individual in the community, who may be away on vacation or just too busy to do the job at the time when it must be done." "It behooves me to cry to high heaven about the doctor crisis in relation to CAA examinations," says an AOPA insurance-executive-pilot. . . . But our favorite is

For Men who Really Know Pipes
Royalton
CROWN
MOUTHPIECE TUBE prevents backflow of moisture
CONDENSING CHAMBER traps and holds bitter juices and sediment
BOWL GUARD keeps shank and bowl dry
REMOVABLE SECTION eases thorough cleaning
CHAMBER GUARD bars tobacco fragments from bit
Patented
$1.50 Selected Briar
How Can a Pipe Stay Constantly Dry and Cool—Even During Periods of Heavy Smoking?...
ANSWER: Design a condensing well and other inbuilt safeguards that are sure to trap juices and stray bits of tobacco...There is only one pipe so equipped—Royalton Crown. Every pipeful proves that it keeps bowl and stem enduringly dry, providing extra dividends of smoking pleasure.
HENRY LEONARD & THOMAS, INC. • OZONE PARK, N. Y.

RYAN PRODUCTION ENGINEERING DEVELOPMENT NO. G 30.36



. . . Another Ryan Step Toward Better Airplanes at Lower Cost

THE PROBLEM: In welded stainless steel parts, the conventional method for relieving the internal stresses and removing the welding flux, involves:

Step 1 – 15 Minutes defluxing in acid tank
Step 2 – 2 Minutes sandblasting per part
Step 3 – 12 Minutes stress-relieving in air furnace
Step 4 – 30 Minutes pickling in acid bath
TOTAL – 59 Minutes

THE SOLUTION: A sodium carbonate salt bath, developed in the Ryan laboratory, revolutionizes the entire stress-relieving and defluxing process as follows:

Step 1 – 5 Minutes stress-relieving in salt bath
Step 2 – 10 Minutes cold pickling
TOTAL – 15 Minutes

THE ADVANTAGES: By eliminating two operations and cutting the required time to one-fourth, this new Ryan process not only saves wartime tax payers $100,000 yearly, but is speeding up production of fighting craft urgently needed in the Pacific war theatre.

THE CONVENTIONAL method for relieving the internal stresses caused by welding certain vital stainless steel aircraft parts, has for years involved a heat treatment requiring *four* operations and fifty-nine minutes.

Approaching the problem from a fresh angle, Ryan laboratory technicians have evolved a completely new sodium carbonate salt bath procedure for stress-relieving and defluxing such parts. Maintaining the same high quality, the new Ryan process is completed in two operations requiring a total of only fifteen minutes.

Today . . . the analytical skills of Ryan laboratory technicians and the ability of Ryan designers and engineers are devoted to the creation of combatant aircraft. Tomorrow . . . Ryan will again devote itself, with the same directness for efficiency and economy, to solving problems of peacetime aviation.

RELY ON RYAN TO BUILD WELL

1922 - 1945

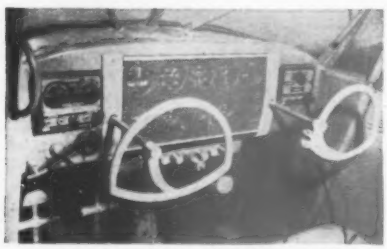
RYAN Airplanes

Ryan Aeronautical Company, San Diego — Member, Aircraft War Production Council, Inc.

DESIGNERS AND BUILDERS OF NAVY FIGHTING PLANES AND EXHAUST MANIFOLD SYSTEMS

RANGER gives you more FLYING TIME greater SAFETY

Experience shows that pilots who equip their planes with RANGER two-way radio get in more flying time. That's because *dependable* radio communication lets them take advantage of marginal weather, enables them to plan longer trips using radio navigational aids, gets them in and out of airports quickly and easily, and gives them a high *plus* safety factor *all the time.*



Typical installation of RANGER model 108-B receiver and model 206, 10.5 watt transmitter. Receiver has 3105 kc spot besides 195-410 kc band, plugs for two sets of headphones and an inter-phone circuit. Transmitter operates from 6 or 12 volt ship's battery through RANGER designed vibrator power supply.

GET THIS MANUAL FREE—

To increase the value of aircraft radio you should use only approved phrases and sequences while carrying on two-way communications—and you should know the many recent changes in these procedures. Thousands of copies of the RANGER Radio-Telephone Procedure Manual are helping pilots get the most from their radios. You are welcome to your own personal copy.

- ***Used by the Civil Air Patrol as an official training directive.***
- ***Contains official CAA and Army procedures, sequences, and phrases—also the phonetic alphabet & other data.***

Write for literature on RANGER transmitters and receivers—Deliveries can generally be made within 24 hours on suitable priorities.

RANGER
Reg. U.S. Pat. Office
AIRCRAFT RADIO EQUIPMENT

ELECTRONIC
SPECIALTY COMPANY
3454 Glendale Blvd.—Los Angeles 26, Calif

RANGER equipment is licensed under A. T. & T. Co. Patents for aircraft Radiotelephone Communication

the one about the commercial pilot who—having the price—passed his exam with a broken back. "I have moved around the country with a growing amazement," he writes, "at how different my lily white body becomes as I pass from one designated physician's domain to another. It has finally led me to join the cult which believes that you are always physically fit to fly if you have the six bucks. The clincher came about four years ago when I faced the problem of passing a six-month renewal physical with a fractured back. I was taped from armpit to umbilicus and in such pain that I could walk only when stuffed to the guzzle with codein—but I passed. I am not going to finger the doctor by name or location—some day I may need a renewal and not even have legs left to get to his office. I can mail him the six bucks and take my physical by 'phone. Bureaucracy, I love you."

Another Lockheed Star?

A friend phoned as we were going to press to say that he had some dope on Lockheed's bid for post-war lightplane fame—and that the craft is a honey. The few details he could furnish would seem to indicate that this may be an understatement.

The plane is low-slung; top of the fuselage is no higher than an automobile. Cockpit hatch is a transparent bubble, giving visibility in all directions . . . It's two-control and has flaps. These flaps and other developments give it 20 m.p.h. landing speed, ability to climb very steeply—"it practically jumps into the air," our man said—and ability to clear a 50-foot object at the end of a 500-foot runway.

"It's the safest job I've yet seen," we were told, "and easily the most maneuverable." It will make a vertical turn in twice its wing span and on the ground can be taxied fast and stopped on a dime without nosing over, owing to tricycle landing gear.

It cruises at 100 m.p.h. on a new, economical two-cylinder engine. Incidentally, the flaps are mechanically operated; no hydraulic or electrical mechanisms complicate repairs or add weight. The prototype which our man flew was one place but the public will get two- and four-place jobs. Lockheed engineers are shooting for a bottom price of $800 and our man wants to buy the first one off the line.

Briefings

The Department of Commerce (and the CAA) may be shaken to its foundations before personnel is adjusted to the satisfaction of the new secretary, Henry A. Wallace. Among other things on the policy level that might be expected from the new management will be an all-out emphasis on the developmental aspects of the Federal lightplane program with the goal of making aviation Exhibit A in the drive for 60,000,000 post-war jobs in the United States. . . .

Floyd Odlum (Mr. Jacqueline Cochran) is said to be seriously exploring the possibilities of a coast-to-coast airplane U-Drive-It service. . . .

"Before I Buy a Plane" by John H. Geisse in the February issue of FLYING has inspired a manufacturer to finance building an experimental model of the Geisse 10-prop lightplane job. The illustration of the plane accompanying the article [drawn by Julian Krupa, of FLYING's art department] is said to have helped the manufacturer make his decision. Your correspondent has been promised one of the first rides in this revolutionary job. . . .

Welch Pogue of the Civil Aeronautics Board made Federal history recently by calling a staff meeting that went unnoted by the newspapers. Off the record, and behind locked doors, he assembled CAB personnel, announced that they deserved to know the high policy behind the Board's activities in connection with international air transport, and then spoke for more than an hour, telling all. It is the first time on record that Federal GI's and stenogs have been given such a detailed view of what goes on behind the scenes.

Draft problems will probably head the aviation industry's list of headaches for some time to come. Regardless of how current drives by the Army for recruits are modified, any inroads on air transport or aviation industrial personnel are going to hurt—a running fight by aviation leadership against further personnel cuts may be expected. . . .

From the west coast comes word that during 1944 one-half of the four-engined bombers, nearly one-fourth of single and twin-engined fighters and one-fifth of the transports were built in west coast plants. Brig. Gen. Donald F. Stace, commanding general of the 11 western states for the ATSC, is responsible for the statement. He also reveals that during the past year 23 experimental planes took off on maiden flights in the area, and that designers and technicians were kept busy with 30 more major projects. . . .

During a recent flight of the Boeing C-97, while the cabin was pressurized, the cabin door blew out. None of the crew suffered any ill effects from the sudden change in pressure. . . . The recently announced air position indicator was designed by the British and was first used by the RAF in their raid on the Eder and Moehne dams.

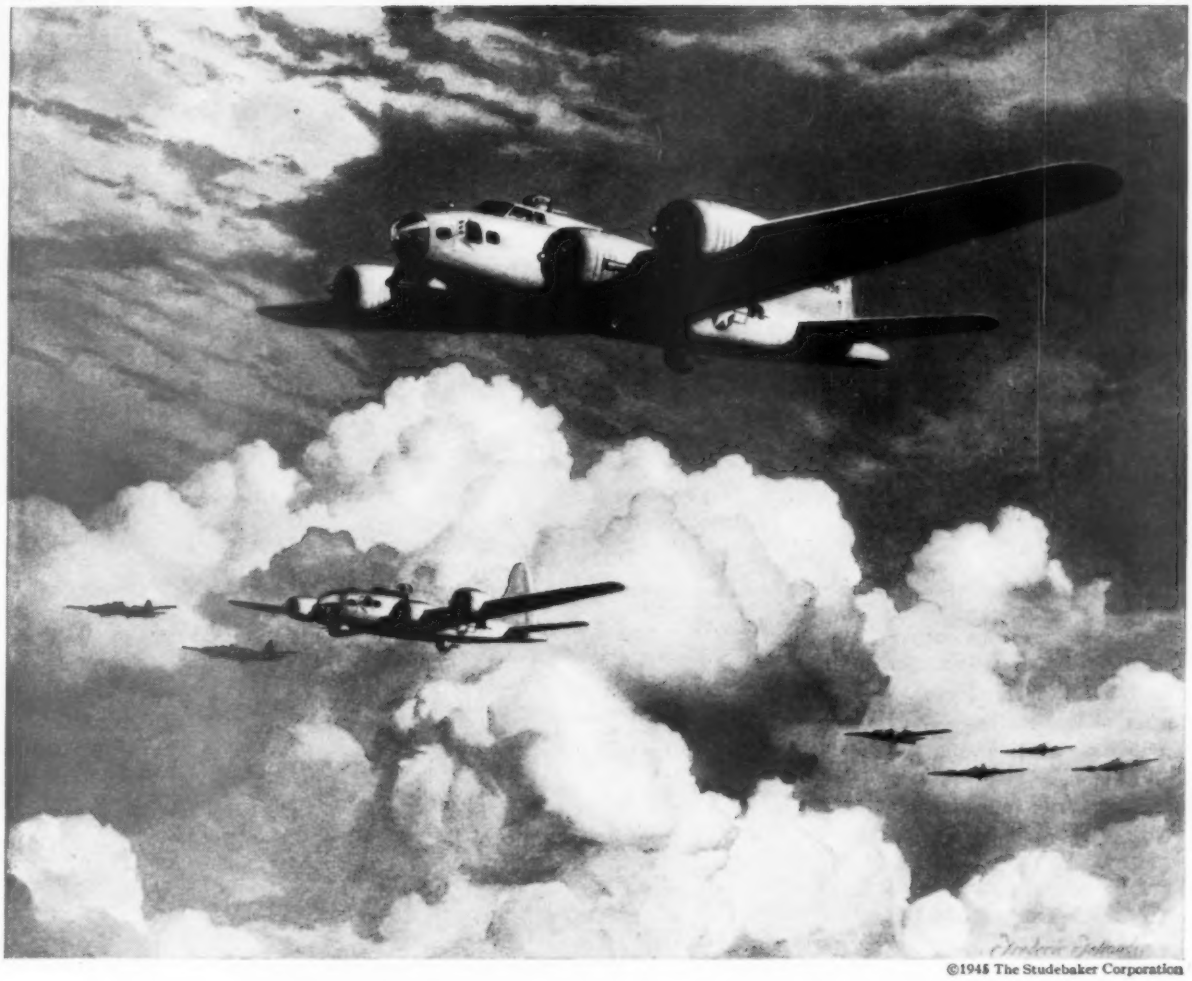
The Surplus Property Board has already sold 7,013 civilian-type planes out of a total of 10,180 declared surplus. They've been paid for, too. . . .

C. Edward Leasure, who has been with the CAB since 1938, has resigned as its chief examiner to take up private practice of law in Washington. Francis W. Brown, assistant chief examiner, will step into Leasure's Board shoes. . . .

Pilots of World War I who won their wings before the Armistice, are eligible for membership in the Order of Daedalians, a fraternal group organized at Maxwell Field. Col. Charles H. Dowman, wing commander of the order, is the man to see—address Hondo Field, Hondo, Tex.

Twenty-five senior airline captains based in Chicago have a total of 283,352 hours to their credit—an average of better than 11,334 hours. Joe Hammer is the high man, with some 17,524 hours logged at last report. . . .

The road running along the southeast



©1945 The Studebaker Corporation

What flyers say counts most with us

MEMBERS of the crews of many a Flying Fortress have written Studebaker about the fine performance of that mighty bomber's engines.

Studebaker prizes the comments of those intrepid men far above any of the official commendations its war plants have received.

The senior civilian test pilot at an important army aircraft modification center voluntarily wrote: "I've flown and tested over 200 Studebaker powered Boeing Forts. Nothing could be tougher on engines than the workouts I've given those ships. I've taken them in saw-tooth climbs from sea level up to where the temperature goes many degrees below zero. Those Wright Cyclones get my vote for smoothness, too."

In proudly fulfilling its wartime assignments, Studebaker has already built over 55,000 Wright Cyclone engines for the Boeing Flying Fortress—over 155,000 heavy-duty military trucks—many thousands of versatile new Weasel personnel and cargo carriers.

Famous for its peacetime motor cars and trucks, Studebaker has but a single purpose right now—to back up our fighting forces with all the military equipment its factories and workers can provide.

Awarded To All *Studebaker Plants*

The war's "surprise" vehicle—It's the Army's new Weasel personnel and cargo carrier—built by Studebaker and powered by the famous Studebaker Champion engine.

Save for the future with

★ WAR BONDS ★

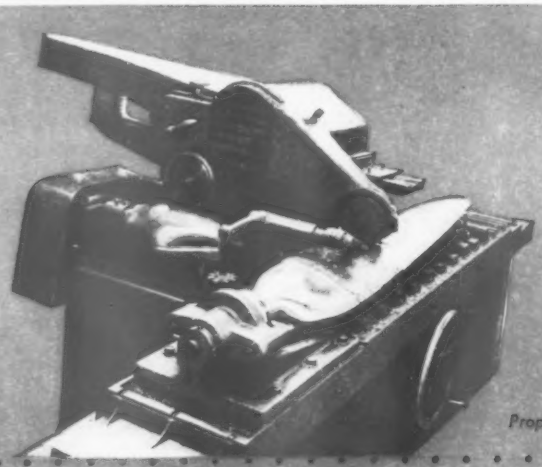
THEY'RE THE BEST INVESTMENT IN THE WORLD

Studebaker

WARTIME BUILDER OF WRIGHT CYCLONE ENGINES FOR BOEING FLYING FORTRESS

Yesterday

Erco "took off" as the first company created solely to mechanize airplane production... by creating the propeller-profiler, the automatic punch and riveter, the stretch-press, the metal shrinker and the sheet metal former... Well before Pearl Harbor, Erco extended its pioneering into the personal plane field and engineered the now historic spin-proof ERCOUPE.



Propeller-Profiler

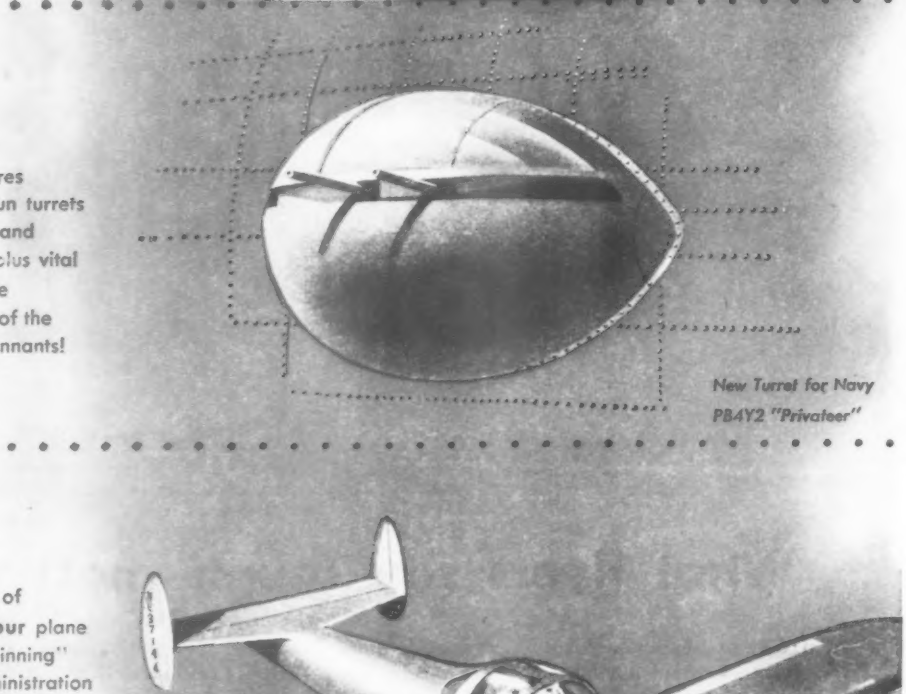
Today

Erco designs and manufactures spherical and streamlined gun turrets for Navy bombers... radar and other military equipment... plus vital production machinery for the aircraft industry. Erco is one of the few winners of four "E" pennants!

New Turret for Navy PB4Y2 "Privateer"

Tomorrow

Erco will resume production of the spin-proof Ercoupe... your plane ...certified "incapable of spinning" by the Civil Aeronautics Administration ...precision-engineered with Erco "know-how." You won't have to wait for improvements in personal planes — they'll be waiting for you in the post-war Ercoupe!



ERCOUPE —the certified spin-proof plane

Buy War Bonds

ERCO ENGINEERING AND RESEARCH CORPORATION
Riverdale, Maryland

corner of Wright Field is named the "New Germany" road.

A young Congressman from Texas, Lindley Beckworth of Upshur county, has introduced a bill notable for two things: It is only 14 lines long—a record for Congressional brevity—and it proposes setting aside $50,000,000 "for the purpose of aiding any individual or company in the carrying on of experimental work in connection with the development of new types of aircraft or the improvement of existing types of aircraft, or in connection with other developments in the science and art of flight." The bill was inspired by a personal survey the Congressman made last year of aviation here and in Alaska. END

Building the Superfort Team

(*Continued from page 34*)

an instrument begin to fluctuate, he would trace the connections immediately rather than tear the instrument down to see what was wrong inside.

In the last five weeks of his training the student is steeped in the knowledge of "cruise planning," including the intricacies of "cruise control." Accuracy in these arts of flight engineering may spell success or failure of a mission. Cruise planning means the deliverance of the maximum pay-load of bombs on a given object; cruise control means the scientific application of power best suited to the conditions under which a particular flight is made.

Armed with pencils, paper, graphs, charts and slide rules, the flight engineer plots out an actual mission. First he must determine the amount of fuel the mission requires, the power settings for this specific flight, ascertain the mechanical condition of the plane, assimilate the weather to be anticipated on both legs of the mission, and compile all necessary data to apply in the event plans are changed just before or even during the flight.

Before a *Superfortress* can roll down a runway Tokyo-bound, the flight engineer must know the length of runway he will need with the total load; the speed of optimum climb; the most effective altitude to be flown out and back; the manifold pressure setting and r.p.m.'s required to attain that altitude; what change of r.p.m.'s or settings would be required in the event of failure of an engine; the changes necessary after release of the bombs, since this changes the total weight of the plane in a few brief seconds and will affect fuel consumption and general performance.

Although the flight engineer is no meteorologist, he must know the air temperatures and head winds and what effect they will have on the airplane. In flight, engine trouble may suddenly present the problem of trying to stay in formation, hence he must be capable of making quick, accurate decisions. An error in any one or combination of these matters might not only mean failure of a mission but the loss of more than $1,000,000 worth of equipment and, perhaps, the lives of his comrades.

Flight tests of the flight engineer's knowledge are made on six-hour missions and on longer over-night flights. In AT-22's—stripped down versions of the *Liberator*—six flight engineers are provided stations identical with those they will find later in the *Superfortress*. This permits actual flight familiarization with the controls and instruments and an introduction to emergency procedures. It also illustrates how and why the flight engineer is given team transition training with the airplane commander and pilot upon graduation. With a multitude of duties confronting each crew member, it is essential the three-man crew (airplane commander, pilot and flight engineer) be given full opportunity to develop teamwork.

Since the *Superfort* incorporates components foreign to our other aircraft, it is only natural that the training of the airplane and engine mechanics should follow a specialized path. Trainees take in a 19-week course of "sweat-and-grease" at the A&E mechanics school at the Amarillo Army Air Field, Amarillo, Tex. The first 13 weeks are devoted to sectional instruction, broken down into groups of study, and the final six weeks deal mainly with "B-29 transition."

Newcomers are introduced to their course by degrees, with separate instruction on structure, electrical systems, secondary systems—oxygen, hydraulic, etc. —engines, fuel and oil systems, propellers, instruments, engine operation and test, and engine change. Considering the size of the *Superfortress*, plus the latest developments incorporated into its design and assembly, there is a necessity for specialization among the mechanic-students.

At Amarillo, the embryo mechanics remain in school for 112 days, moving through 13 individual training departments. After a 48-hour introduction to tools the aircraft mechanic student begins his quest for aircrew wings in earnest.

He learns the structural units and members of the *Superfortress*, its bomb load and its dimensions. He becomes thoroughly familiar with the control systems —more complex in some ways than those of the *Flying Fort*, yet smaller in size— the landing gear systems and how to insure maximum performance in the air through scientific loading and balancing.

The student traces down every strand of the six miles of wire shown on detailed blue prints which, when opened fully on a hangar floor, are 120 feet long. He also spends 12 days probing the problems of fundamental electricity and learns how to dig out the "wire gremlins" from the seven generators forming just one part of the *Superfort*. Combined, these generators could provide enough power to light 250 homes in Amarillo. Then the mechanic must master the controls of the turbosuperchargers built into each engine and become a skilled mechanic in the repair and maintenance of the fabric-covered sections and in structural and plexiglas repair. Since they have pressurized cabins, the *Superforts* must have all "blisters" thoroughly inspected and kept in seal-tight condition.

An eight-day study of the fuel and oil

"It's the little things you look forward to!"

Saturday afternoon—digging up that sunny spot where the wife plans to put petunias. The ground smells good, and there's a gentle May breeze blowing.

Then you'll go to the movies—you'll get into your gabardine suit and put on a pair of smartly styled, extra comfortable W. L. Douglas "Commanders"!

$6.50 to $8.50
Other styles $5.50
Denver West Slightly Higher

W. L. Douglas
W. L. DOUGLAS SHOE CO.

Shoes
BROCKTON 15, MASS.

Stores in Principal Cities
Good Dealers Everywhere

INVEST IN VICTORY — BUY BONDS

arterial systems is next on the training agenda. Study of filters and intercoolers prefaces the two-day course in repairing, replacing, disassembling and reassembling the large pressure carburetors. The giant engines are given their place in the training program, with emphasis placed on pre-flighting the engine and trouble-shooting. The mechanic must know the complexities and construction of the self-sealing gas tanks, servicing and replacing of entire propeller units, the adjustment of energizers, and the operation of engines under arctic, tropic or temperate conditions.

Postgraduate courses are conducted for some Army A&E mechanics, from which they graduate as a "remote control turret specialist." Some students eventually evolve into RCT-mechanic-gunners, serving as repair crewmen and also as gunners in a combat crew. However, the RCT specialist on the ground is the real expert. Graduates tagged for this training are sent to Lowry Field for 18 weeks of training in this lone subject.

Radio operator-mechanic trainees now graduating from the regular Army Air Forces Training Command schools, are given *Superfortress* radio instruction as an integral part of their regular course in this subject.

Actually there is no special course established for this particular crew-member. Included among those men selected for this important post aboard the super bombers, are combat returnees who have acquired experience in the arts of radio operator-mechanic but on types of aircraft other than *Superfortresses*. If they can meet the previously described requirements, and are available, they are then assigned to one of the regular radio schools for a refresher course.

Gunners complete the crews manning the *Superfort*. Training of these men presented an entirely different problem than that of gunner-candidates for *Fortresses* or *Liberators*, because the *Superfort* employs the remote control system.

Aboard the *Superfort* the bombardier is the "gunnery captain." He is taught the remote control system of gunnery and takes his supplementary training along with the other gunners. Training teams are comprised of five-man groups. One is the bombardier, one, the armorer, another the electrical mechanic who doubles in .50-caliber flexibles, still another the RCT-mechanic-gunner and the fifth man, the "career" gunner who mans the tail guns but has no other assigned duty aboard the bomber.

The training Command's *Superfort* gunnery program has been in operation since April, 1944. The course is now lengthened from six weeks to 12 weeks. Three AAFTC stations are used for this program—Buckingham Field, Fort Myers, Fla., Las Vegas Army Air Field, Nev., and Harlingen Army Air Field, Tex. The basic skills, such as knowledge of machine guns and firing on the ground, consume about eight weeks and the air-to-air firing is done in the final four weeks. Trainees go through half the course as individuals and team up into groups of five during the latter half.

Gunners are taught to handle some of the most intricate mechanisms and devices evolved in aircraft armament. *Superfort* gunners are comfortably seated in sighting blisters, actually removed from the gun turrets themselves. Each sighting station is equipped with a sighting unit, through which the gunner tracks his target. The navigator has instruments registering the outside temperature (which affects the air density), altitude and speed of the *Superfort*. He sets these readings on dials which relay them through electrical impulse to the sighting device and central control unit.

The gunner must catch an enemy airplane in the sighting unit, which has a circle of small dots on the outer rim and a luminous red-orange dot in the center. Here his knowledge of aircraft recognition comes to the fore. He must instantly know the type of aircraft he is tracking, as well as its wing-span. He sets this span on a dial, which aids in controlling the range of fire. By turning the range wheel with his right hand, he opens or closes the outer rim of dots until they embrace the wing-tips of his adversary.

Then he is ready to fire, accomplished by pressing down with either or both thumbs on the trigger bars mounted on each side of the sighting unit. Finesse is developed in switching control of the plane's guns from one man to the next, so that the man in the most advantageous sighting blister can direct the plane's concentrated fire at attacking aircraft.

Each *Superfort* is equipped with five turrets—two upper, two lower and one in the tail. Three turrets can be controlled and fired by a single gunner. In battle, a gunner, intent upon tracking his target, might swing his guns in line with some part of his own plane. This is prevented by automatic fire interrupters which "cut out" the firing circuit when the gun arc passes through any section of the bomber.

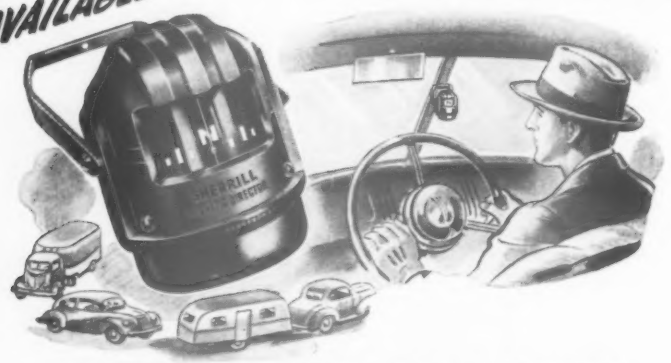
Training in interphone procedure is stressed strongly, for this is the medium of communication within the plane and is necessary to smooth teamwork. Actual air-work to achieve accuracy in air-to-air firing is provided in obsolescent *Liberators* which have *Superfortress* remote control turrets mounted in them.

Team training of the pilot, co-pilot and flight engineer in their term of transition as well as the combined gunnery training of the five crew members, is accomplished at stations of the Training Command. In one sense this is a form of crew training but it is different from the courses comprising "combat crew training." The latter is handled by the Second and Third Air Forces whose operational training units bring together the graduates of the Training Command schools and make complete *Superfortress* crews of them.

Quotas are filled on a basis of individual qualification and availability and not by application. No abbreviated courses are available to experienced personnel including the flight crew, which have been assigned to other aircraft, although officers wishing to apply for a transfer to a *Superfort* group from their present assignment might do so through the officers'

SHERRILL
AVIATION TYPE "Magnetic "DIRECTOR"
AUTO COMPASS

AVAILABLE AGAIN!



HELPS SAVE TIRES, GAS and TIME!

Use a Sherrill Aviation-type Auto Compass on your car. Don't get lost. It's simple to install on dash or windshield. Accurate. Durable. Easy to compensate. No special tools required for installation or compensation. Modeled from famous battle-tested Sherrill Direction-finding instruments now standard of U. S. Armed Forces. Modern stream-lined plastic construction. Material and workmanship guaranteed. A Sherrill Auto Compass will give years of precision service. See your dealer now. The supply is limited.

Sold at Hardware, Drug, Dept., Chain Stores and Service Stations. Only $2.00

SHERRILL RESEARCH CORP., Peru, Indiana

POWER TO WIN

ARMY E NAVY

Awarded to the Detroit and Muskegon Plants of Continental Motors Corporation for High Achievement

Your Dollars are Power, Too! Buy War Bonds and Keep Them!

"Grasshoppers" Over Manila

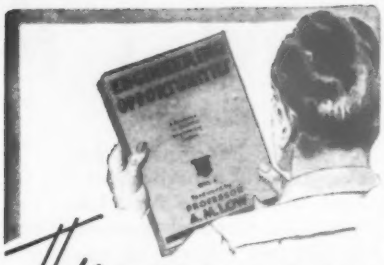
"Grasshopper" planes again made headlines when General Douglas MacArthur triumphantly marched back into Manila. In the skilled hands of versatile American pilots, these highly maneuverable, Continental-powered planes were first over the Philippine capital to spot artillery and fortifications.

The startling and brilliant feats of these "Grasshoppers" in many capacities are almost incredible.

Continental Red Seal Power — the Power to Win — is also contributing much as the motive force of Tanks, Tank Destroyers, Amphibians and many more types of vital fighting equipment on all fighting fronts.

Continental Motors Corporation
Aircraft Engine Division
MUSKEGON, MICHIGAN

Continental
Red Seal
Engines



This FREE BOOK
is also your
GUIDE for the FUTURE

When peace comes new opportunities will arise for thoroughly trained engineers. Aviation, electronics—many new developments will broaden the engineering field. Learn more about these opportunities. Without obligation, write for our free book of home study courses, planned by foremost engineers and world authorities. Canadian Institute of Science and Technology, Limited, 284 Chester Building, 219 Bay Street, Toronto 1, Ontario.

Aeronautical Engineering

A. F. R. Ae. S. Exam.
Air Ministry Exams for Ground Engineers.
General Aeronautical.
Advanced Aeronautical and Aeroplane Design.
Aero Engines Course.
Aircraft Apprentice.
Pilots' "B" License.
Air Navigators' Certificates.

Mechanical Engineering

A.M.I. Mech. E. Exam.
General Mechanical.
Mechanical Drawing and Design.
Works Manager.
Die and Press Tool Work.
Sheet Metal Work.
Welding Course.
Maintenance and Stationary Engineers.
Refrigeration Course.
Institution of Production Eng. (A.M.I.P.E.).
Commercial Eng. and Works Management.

Civil, Mining, Structural and Automobile Engineering

A.M.I.C.E. Examination.
Civil Engineering.
Civil Engineering Specifications, Quantities.
Road Construction.
Surveying and Levelling.
Hydraulics.
A.M.I. Struct. E.
Structural Engineering.
Structural Design.
Reinforced Concrete.
Heating and Air-Cond.
Railway Engineering.
Royal Sanitary Institute Examination.
Sanitary Engineering.
Institute of Builders Exam. (L.I.O.B.).
Building Construction and Drawing.
Advanced Building Construction.
Special Combined Building Course.
Architecture.
Geology and Mineralogy.
Metallurgy.
Petroleum Technology.
General Mining Practice.
Mining Engineering.
Automobile Engineering.
High-speed Diesels.
Electrical Equipment of Automobiles.

Electrical Engineering

A.M.I.E.E. Examination.
General Electrical.
Alternating Current.
Electrical Installations.
Power House Design.
Neon Lighting.
Electric Traction.
Electricity Supply.
Electric Meters, Measuring Instruments.
Design and Manufacture of Electrical Machinery and Apparatus.
Telegraphy Course.
Telephony Course.

Radio and Allied Groups

A.M. Brit. I.R.E.
General Wireless.
Advanced Wireless and High Frequency.
Radio Servicing, Maintenance Repairs.
Short Wave Radio.
Practical Television.
Sound Pictures.

General, Educational

University of London Examinations.
London Matriculation.
Intermediate and Final B.Sc. (Pure Science).
Higher Mathematics.
Practical Mathematics.
General Education.
Cost Accountant's Course.
Complete Salesmanship.
Advertising.
Sales Manager's Course.
Modern Languages.

MAIL THIS COUPON TODAY

Canadian Institute of Science and Technology, Limited,
284 Chester Building, 219 Bay St., Toronto 1, Canada.

Please forward free of cost or obligation of any kind your 176-page handbook, "ENGINEERING OPPORTUNITIES."

Name .....

Address .....

Course interested in..... Age....

.....

Branch of Military Personnel. Enlisted crewmen should direct their request to the Enlisted Men's Branch of Military Personnel. However, reports would seem to indicate that at the present time their chances for securing such a transfer are quite slim.

Since AAFTC also selects trainees from flying personnel, unassigned non-returnees and combat returnees, there is no specific point at which such men might be assigned to school. This is determined solely by their experience and qualifications.

For example, radio operator-mechanics who are combat returnees and selected for *Superfortress* assignment, are given refresher courses at regular radio schools. However, those selected to be technician-gunners must go through the *Superfort* gunner program, plus the courses available in their specialty. Generally speaking, past experience in the usual form of flexible gunnery cannot be substituted for taking the full *Superfort* gunnery course.

Thus are formed the highly-specialized crews manning our *Superfortresses*. Each individual is an integral part of a finely trained combat team—with each team a still larger part of the entire body that comprises our 20th Air Force. END

What is Weather?

(*Continued from page 32*)

30° north latitude, building up the high pressure belt in that area. The remainder of the air continues its northward flow toward the pole and through the region of the prevailing westerlies, sinking over the North Pole, contributing to the high pressure dome already existing there.

It is obvious that there cannot be a continual evacuation of air from the equatorial zone and a piling up to the north around the pole. If the process were to continue, eventually all the air would be north of 60° north latitude and there would be no air at all over the equatorial zone. Since no vacuum exists in the atmosphere, there must be a means by which the system of circulation of atmosphere is kept in balance. There is such a system: What actually happens is that air piles up north of what we call the polar front—a zone between air masses of polar origin and air masses of tropical origin. As the air continues to accumulate, the high pressure area becomes stronger and stronger until finally the polar front is unable to hold it in that region and the northeasterly current from the pole breaks through into the area of prevailing westerly wind.

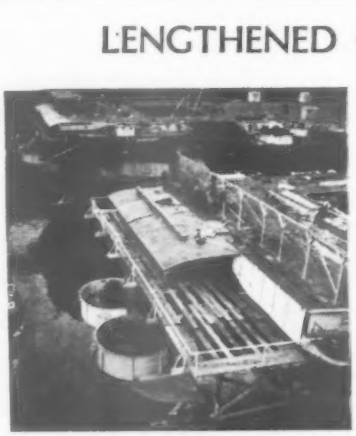
Thus, the middle latitudes, lying between the cold and warm areas of the earth, become like a battleground, alternately invaded by surges of cold air from the north and warm air from the south. When cold air meets warm air they do not mix readily. Each mass tends to remain intact, with the cold air sliding beneath the warm air or the warm air may advance over the cold. The warm air will never crowd out the cold, because of their relative densities, but warm air may *replace* cold air as the cold mass moves out.

The cold air is separated from the warm by a sloping surface, which is called a *front*, a surface between the cold and warm temperatures. It is the mobile line where this boundary touches the surface of the earth that appears on your weather map as a front. Usually, fronts extend over several hundred miles and sometimes well over a thousand or two.

This sloping frontal surface is the *major cause* of weather that constitutes a hazard to flight operations—turbulent conditions, thunderstorms, icing, and all forms of precipitation. The cold air acts as an inclined plane which forces the warm air upward and lifts it to higher levels. As air rises it expands, which causes it to cool. When it has cooled so much that it can no longer hold all of the water vapor it carries, the excess moisture condenses out as clouds. If this rising and cooling continues, rain or snow may fall.

The weather along a front, therefore, is caused by the lifting of warm air by the wedge of cold air, and the extent of the dangerous weather area is governed by the steepness of the slope of the front. A steep slope produces a narrow band of

LENGTHENED CARRIER DECK



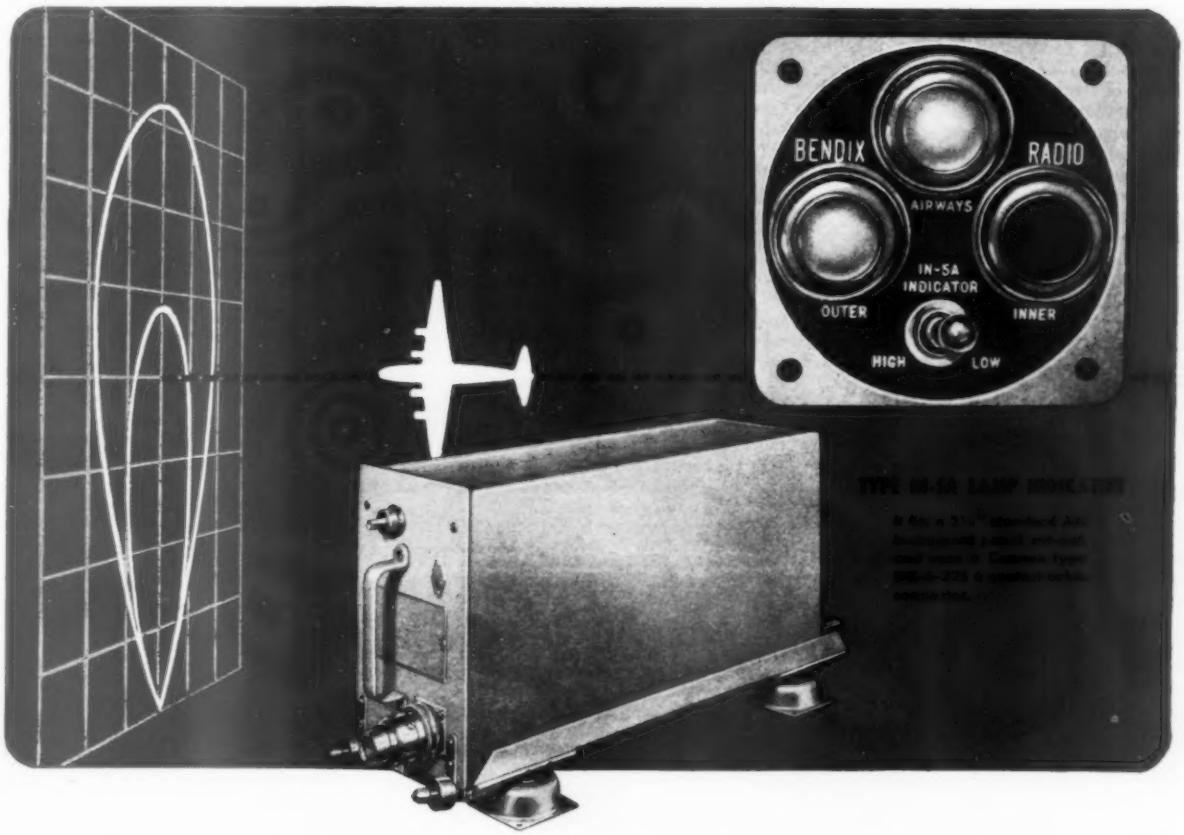
AN IMPORTANT change on British escort carriers—"baby flat tops"—is a 15-foot addition to the flight deck which now gives the carrier a total deck length of 465 feet. The 87-foot-wide addition is affixed to the deck in three sections. Two such sections are shown on the carrier pictured at left undergoing the change at Vancouver's Burrard Dry Dock.

Another modification is the thorough weatherizing given the carriers to meet U.S. and British specifications. When completed, the ships are entirely weatherized, even the guns steam-heated for operation in northern waters.

Presenting

A NEW 75 MEGACYCLE MARKER RECEIVER

Improved Indication at Low Battery Voltage—A new minimum in unwanted lamp operation—½ A.T.R. Size Case—Reduced Weight



Does your marker receiver give good indications when battery voltage drops to eleven (or twenty-two) volts? Does unwanted lamp operation confuse the pilot during instrument approaches? These difficulties have been eliminated in the design of the new Bendix Radio MN-53 marker receiver; and, in addition, valuable weight and mounting space have been saved.

This receiver is available in a number of different types. This same unit may be used with either twelve or twenty-four volt systems. A centralized radio power supply may be used, or an individual dynamotor may be plugged right into the unit. In addition there is a model that is both mechanically and electrically interchangeable with existing airline marker equipment.

Another feature of this new marker receiver is variable coupling of the intermediate frequency transformers. IF adjustment is thus greatly simplified and the desired band pass characteristic can be easily obtained.

For further information on this latest product of Creative Engineering, write direct to the Sales Department, Bendix Radio.

BENDIX IS A TRADE-MARK OF BENDIX AVIATION CORPORATION

Bendix RADIO DIVISION

BENDIX AVIATION CORPORATION, BALTIMORE 4, MARYLAND

STANDARD FOR THE AVIATION INDUSTRY

clouds and heavy showers, while a shallow slope causes a wide band of fog, and light continuous rain.

All fronts are basically the same—a surface separating air masses of different temperatures. The types of weather which may be associated with a front will vary considerably, depending upon the speed with which it moves and the steepness of the frontal slope as well as the temperature and moisture content of the air masses involved.

There are three general types of fronts, and by recognizing them you can anticipate the kind of weather you are about to encounter in flight. There is the *cold* front, which occurs when polar air invades the middle latitudes. There is the *warm* front, which occurs when a surge of tropical air is permitted to enter the middle latitudes by the easterly movement of polar air. And then there is the *occluded* front, which results when a cold front overtakes a warm front, and the warm air mass is squeezed upward by two meeting masses of cold air.

Each type of front brings a distinctive type of weather. The influence of each upon flight conditions are great and will be discussed in later articles.

Is the Stall Landing Obsolete?

(*Continued from page* 61)

with the airspeed indicator and the flying sense with a good safety margin, despite the preoccupation of the novice and the absence of a rate-of-climb indicator. And as for the latter, no lightplane pilot need worry about excessive rate of descent while using the maximum glide. The rate of descent is very slow at this speed, and particularly so without flaps.

The high precision to be found in this maneuver comes from the combination of airspeed and glide path: the plane is actually flown to the desired spot and the glide broken slightly. When the spot is reached, on go the wheels. It will be shown in a moment that the wheels can literally be plastered on the runway with less shock than one gets in a full-stall landing. When the wheels strike, the stick is eased forward and the throttle is closed.

Here is the important point: the plane is not held off the ground, as in a stall. It can be put on the ground forcibly, if necessary, at a precision airspeed. This speed is usually reduced from the maximum glide because of the "flaring" procedure, so that at the time of landing the speed is about that of the normal glide (stall plus 40 per cent). This is a good, safe landing speed for any airplane.

The question now might be raised: "how hard did the plane hit?" It was just mentioned that we could force the plane on, and that sounds rough. Let's approach the subject by means of the full-stall landing, in which planes are dropped from one-half to 1½ feet.

First of all, although it is possible to use the maximum glide in such a landing, most students have been taught to use the normal glide or possibly less. At the key position the throttle is usually closed and the plane headed toward the field. The pilot consciously tries to land on a certain spot but he seldom lands with greater accuracy than 400 or 500 feet (remember the 200-foot precision landing that was so easy to miss?).

Gliding down with only partial control, the glide was broken at 20 or 30 feet, decreasing what little control there was. The nose rises, blocking out the runway, leaving the pilot with little knowledge of his drift. The ground comes up and the stick goes back. The airspeed is so slow now that the plane stalls, anywhere from an inch (in rare instances) to 18 inches from the ground. This is an ideal position for a snap stall, a dropping off on one wing, and a ground loop. It is also an ideal attitude for a sudden gust to pick up the plane or a wing and wreck it. Finally, because the plane is partially airborne, the brakes aren't very effective and a ground loop would be difficult to stop.

How hard did that plane hit? The formula for rate of descent in feet-per-second is as follows (assuming a free drop from a stall, and neglecting effect that may be derived from air cushioning close to ground):

$$V = 2gD$$

where V is the rate of descent in feet-per-second, g (gravity) is 32.2 feet-per-second, and D is the distance dropped in feet-per-second.

A plane that was stalled at only 24 inches would strike the ground at:

$$V^2 = 2 \times 32.2 \times 2$$

$$V = \sqrt{64.4 \times 2} = 11.3 \text{ ft/sec (approx.)} = 680 \text{ ft/min.}$$

But 680 f.p.m. is not an excessive rate of descent, although it is fast enough. A full-stall landing, therefore, made from a height of two feet, strikes the ground as hard as a plane would hit if the pilot flew it right on in at 680 f.p.m. descent without breaking his glide.

Let's figure out the rate of descent for a landing from only two inches, which every one will agree is a smooth, easy landing.

2 inches = .167 feet.

$$V = \sqrt{64.4 \times .167} = 3.3 \text{ ft/sec (approx.) or } 200 \text{ ft/min.}$$

But 200 f.p.m. is a very easy rate of descent (which we already knew because a landing from two inches is so easy). Therefore, one could "plaster" a plane on the runway without breaking the glide, if he held the rate of descent to 200 ft/min, and would still land lightly.

Here are arguments for and against each type of landing:

The STALL LANDING is reputedly better because:

1. The airplane touches down at a slower speed. There is, therefore, less energy to be dissipated, which reduces the seriousness of any crash which may occur during landing.

2. The landing run-off is shorter (provided a slower glide is used. See Argu-

Built for People
Who are going places
It'll be your plane after the war . . . and a flier's favorite all the way . . . designed to be smart and comfortable by experienced craftsmen. It's a two-place model powered by the famous Lycoming 75 H.P. dual ignition motor. Here's a plane that has everything; appearance, comfort and performance. It will be available after the war.
Funk
FUNK AIRCRAFT CO., COFFEYVILLE, KAN.

RICKENBACKER SEES TWO FUTURES AHEAD FOR AIR TRANSPORT

"There are TWO futures ahead—not one—for America's air transport. The first is the job of reconversion to our peacetime economy. In this job air transport will use planes designed before the war—hitherto unavailable because of military needs. Greater speeds, greater comfort will be inherent in such planes.

"We are now busy with the second phase of development. In fact, we have already contracted for a fleet of Lockheed Constellations, largest and fastest four-engine transport plane in the world, and a fleet of Curtiss (CW-20 E) Commandos, largest and fastest twin-engine transport plane. With a speed of more than 300 miles per hour, our Constellation passengers will find themselves leisurely journeying from New York or Boston, Chicago or St. Louis, to Miami in from four and one-half to five hours."

by EDDIE RICKENBACKER, *President and General Manager Eastern Air Lines, Inc.*

"Comfort-protection" to be provided by AiResearch

Jot down "new air routes" as something to expect postwar. Set them at 20,000 . . . 25,000 . . . even 35,000 feet — up where thinner air makes for smoother, faster, more economical flight.

Make note of AiResearch "*comfort-protected*" cabins, too. These will be peacetime versions of the *pressurized* cabins which today make high altitudes livable for Boeing B-29 Superfortress crews.

"Comfort-protected" cabins will do the same for you in future airliners. AiResearch-perfected devices will seal thin, icy-cold air outside your cabin, keep the pressure *inside* measured to your personal comfort. Other AiResearch controls will free your cabin of smoke and odor, keep it cozy-warm in winter, refreshingly-cool in summer.

And that's not all. Just wait and see what future wonders of air and temperature control AiResearch will bring to your living on the ground! AiResearch Manufacturing Company, Los Angeles and Phoenix.

ARMY E NAVY

"Where Controlled Air Does The Job" • Engine Oil Cooling Systems Supercharger Aftercooling Systems • Engine Air Intercooling Systems Temperature Control Systems • Automatic Exit Flap Control Systems Cabin Pressure Regulating Systems

AiResearch
DIVISION OF
THE GARRETT CORPORATION

WRITE and tell us any problems you may have on precision parts. Here, in one organization with two great plants, are ALL the facilities the most complex production problem requires . . . from engineering skill through all phases of machining. Long before the war, our performance earned top rating in the industry. We've "come through" under total war output . . . and we intend to stay at the top after Victory! We may have an open capacity on your requirements now. Ask our Executive Sales Office to mail you a booklet covering our *complete* plant facilities.

★ BUY MORE BONDS ★

● *THE SUCCESS of the Aeronautical Products, Inc. Helicopter, designed and built by our own craftsmen, promises new accomplishments in the post-war age of flight.*

AERONAUTICAL PRODUCTS, Inc.

DETROIT PLANT
and Administrative Offices:
18100 Ryan Road, Detroit 12

OHIO PLANT:
Washington Court House
Ohio

ment 40 on this and the following page.]

3. Stall landings are accompanied by a shorter run-off if the plane has no brakes, or if the brakes must be used gently as in some very heavy airplanes.

4. The landing run-off is shorter in emergencies, such as in very small fields, trees, water, mountains, hillsides, etc. But this involves a very slow glide. [See Argument 40.]

5. The stall landing is best in certain types of planes [this is usually proved to be pilot inadequacies!].

6. The airplane is designed to be landed on three points. Therefore the stall landing must be better. [But a plane can also be designed to land with a nose wheel, which is even better and dynamically stable; a tailwheel gear is unstable.]

The STALL LANDING is undesirable because:

7. At the time of landing the speed is very slow and any miscalculation of altitude is dangerous.

8. Because the speed is low, the controls become less effective.

9. Vision is obscured because the nose is high.

10. The tendency to ground loop is more pronounced in a nose-high, low-airspeed condition.

11. Tailwheel landing gear is inherently unstable and to land on three points accentuates the ground loop, once it has begun.

12. Because almost all full-stall landings are made from heights above two inches, the stall landing is hard on the airplane despite the lower landing speed.

13. The full-stall landing is accompanied by low airspeeds both during the landing and during the glide. This is dangerous, particularly in gusty wind.

14. The accuracy is not easily controlled, except when the minimum glide is used, which is hazardous.

15. If an error is made in the glide, resulting in undershooting the field, correction is difficult and often impossible. Many crackups have occurred under these conditions. A plane of high wing loading may easily stall and crash.

16. Students inherently dislike the full-stall landing; some tend to freeze on the controls and all of them learn the wheel landing more easily, readily, and quickly.

The WHEEL LANDING is undesirable because:

17. The approach is usually beyond gliding distance from the field, depending solely upon the engine to gain the field.

18. There is some danger of nosing over in soft ground, or if the pilot is not dexterous. (This is not entirely true because the high airspeed gives plenty of longitudinal control.)

19. Requires considerable run-off distance if no brakes are available. [But see Argument 40.]

20. Landings at high speed put excess strain on the tires and landing gear and raise the amount of energy to be dissipated. [But modern gear and tires can take it and besides, the strain is low compared with the effect of a stall landing from only one foot.]

21. The technique is essentially a "lazy" one, requiring less effort.

22. High-speed landings wear out rubber and brakes much faster than low-speed landings. [But full-stall landings are harder on the whole airplane.]

THE WHEEL LANDING is better because:

23. It is easier to teach a beginner. He feels better, learns it more quickly and is actually safer. The tendency to freeze on the controls is nil.

24. The glide, the approach and the touchdown are safer because the plane is always under control.

25. The accuracy is greater, because the pilot knows exactly where he is going to land and can land during the maximum glide.

26. The wheel landing is consistent as to accuracy, safety, and ease of touching down.

27. Vision is better; the runway is in full view until the tail goes down.

28. Control is adequate during the run-off until the tail touches, then adverse effects have been noted and corrected for.

29. The wheel landing is more gentle and therefore easier on plane, landing gear and passengers.

30. There is adequate speed for an emergency take-off at any time up to the moment the tail drops and touches the ground.

31. Wheel landings striking the ground from an unbroken glide of 200 feet per minute, are easier on the plane than a full-stall landing from three inches.

32. There is no danger of premature stalls, either during the glide, the turn or the landing.

33. There is less need for accurate depth perception, as the plane is always in a safe attitude until the landing is made.

34. Because the plane can be "plastered" on the runway, this landing is safer and better under conditions of fog, snow, rain or any other condition of poor visibility.

35. There is actually less danger of nosing over in a wheel landing because the elevator control is high due to high relative wind over the elevators.

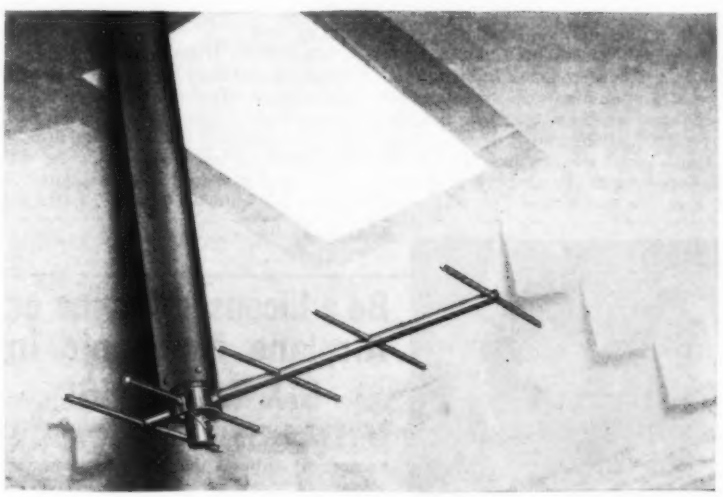
36. The wheel landing is best, particularly for planes of high wing loading, because the maximum glide is used. A slow glide may be fatal if loss of airspeed stalled the plane below 1,000 feet.

37. There is actually less danger of overshooting the field by veterans and students alike because the plane is literally landed on the desired spot by pushing forward on the stick when the spot is reached!

38. Brakes are more effective in a wheel landing because there is more weight on the wheels. In a stall landing, the plane is partially airborne.

39. In a wheel landing (using maximum glide) with flaps down, an emergency take-off is easier because the flaps can be raised immediately. If the flaps were raised in the normal or minimum glide, several hundred feet of altitude would be lost or the plane might stall.

40. Wheel landings, speed for speed, re-



THAT 'TIE RACK'

WITH the exception of the Norden bombsight, nothing has been shrouded in secrecy as much as radar. The antenna shown above on a *Helldiver* is still in wide use by the U. S. Navy, but is becoming obsolescent. One of these "tie-rack" antennas normally has been installed under each wing of a plane. From right to left in the picture, the cross bars are identified as follows: directors (first three bars), transmitter, and reflector. The whole antenna transmits or receives radar signals in the direction in which the main center bar is pointed.

The name of this antenna? Yagi—named after its designer, Hidetsugu Yagi, doctor of engineering and professor of electrical engineering at the Tokyo Imperial University. Dr. Yagi was born January 28, 1886, and is considered a world authority on electronic radiation.

quire a shorter roll if brakes are used.

Argument 40 is the real bone of contention. Granted that we have strong brakes to provide the necessary friction, and given the same gliding speed over a particular spot, the run-off is shorter for the wheel landing. The length of roll depends upon the amount of energy to be dissipated: that is, the weight of the plane and the velocity of that weight. In order to expend this energy we may increase (1) drag, and (2) friction. Thus if two planes are gliding at 60 m.p.h., the one that touches its wheels first and adds friction to drag will be the plane that stops first.

It will be argued that in a full-stall landing the glide is slower and that in a stall-down landing the run-off would be shorter. But that argument doesn't hold water because the slow glide is precisely what we want to avoid. Furthermore, if the slow glide is used it may as well be used for the wheel landing, which puts us right back to argument 40: speed for speed, the wheel landing requires the shorter runoff.

Is the stall landing obsolete? The answer must be, "No." But one must admit that the arguments for the wheel landing are much more valid and numerous than those for the full stall. Let no good pilot be content with one or the other, because there are times and places when one will be more suitable than the other. Learn both, know the advantages of each, and be sufficiently versatile in technique to avoid the penalty of carelessness and incompetence in the use of either. END

I Am a Businessman Pilot

(*Continued from page* 29)

By this time I was firmly convinced that a long-range business trip by plane was practical. I notified our field men in Texarkana, Tex., New Orleans, La., Tallahassee and Miami, Fla., Atlanta, Ga., and Cincinnati, O., that they were on our "tour list" and should expect us. This involved flying over every imaginable type of terrain and probably in every kind of weather. On this trip I flew a Luscombe which had a fuel capacity of 14 gallons and consumed 4.4 gallons per hour.

A weather check of our route to Texarkana indicated fresh winds and rain along our flight path but, according to the weather bureau, nothing to alter contact flight conditions. Leaving Chicago at 7:30 a.m. on September 27, we found fairly severe winds but succeeded in skirting the storm area. We flew through a little rain, and it was a bit bumpy, but we proceeded to Springfield, Ill., where we landed at an auxiliary field.

There wasn't a soul around but signs posted on the beacon shack indicated the field was for civilian use—practice for take-offs and landings, picnics or what-have-you. Cape Girardeau, Mo., was our next stop—and it was my first landing on an L-shaped field. From here to Jonesboro, Ark., we encountered several small storms and climbed to 6,000 feet to avoid their turbulence, maintaining contact easily by observing our check points through the scattered overcast. We stopped for fuel at the Jonesboro field, landing on the longest runway I have ever seen. I later took advantage of this by making a cross-wind-downwind experimental take-off for future reference in case of emergency. It was amazing how long it took to get the plane airborne.

Next stop was Benton, Ark., a single-strip field almost hidden in the woods, parallel with a river. Since the landing strip ends on a steep wooded incline, I was forced to slip in and even then didn't have too much room. Nevertheless, any semblance of a field in that country is welcome. Taking aboard sandwiches and coffee, we hopped off for Texarkana and, after flying through intermittent rain, arrived on schedule and in time for dinner in the hotel.

We hopped from Houston to New Orleans several days later in four hours flat, including a refueling stop at Lake Charles, La., where I had the plane thoroughly checked and the oil changed. Our No. 4 cylinder was weak and we were advised there that it should be investigated. With a nice tail wind, we flew over Baton Rouge to avoid the swamp Louisiana country.

We regretted having made hotel reservations in New Orleans, for the airport there can accommodate transient pilots in quarters overlooking beautiful Lake Ponchartrain. Our landing was novel in one way—it was my first approach to a runway over water.

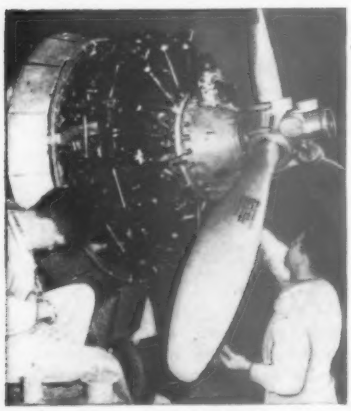
Between New Orleans and Pensacola we had a smooth, beautiful flight. We were required to file a flight plan but for some reason it was not teletyped to Pensacola from New Orleans. Entering the field pattern, I came in for a nice landing. Glancing at the tower I was hit with vigorous flashes of the tower's red light—meaning "get out of there—but quick!" Which I did, winding up in some nice deep sand. Coming in right behind me was a big transport. My mind quickly raced over all the CAR I could think of. When I summoned sufficient courage to ask what I had done wrong, they replied apologetically that at the moment I landed electricians were just testing the light.

Later we flew on to Tallahassee and from there to Gainesville, Fla. Here we enjoyed more good service, for no sooner had our plane been hangared than several mechanics began checking the engine. They discovered we had burned out a valve and I envisioned a long delay. But by 5 p.m. that same day the little engine was purring contentedly. This field had courteous and efficient service, complete repair facilities, cozy, homelike cabins adjoining the field and—a steak dinner.

From there we flew to Miami, Orlando, Belleglade and finally to Hollywood, Fla., landing on the single, east-west sandy runway. Here I met my father and took him for his first flight. While aloft I noticed a beautiful set of glistening runways just outside the Miami city limits and decided to land there, although it was not shown on my map.

With proper ceremony we were signaled to a stake-down location and were then informed that the field had just opened and that ours was the first cross-country plane to land there. This was the "Miami Aviation Country Club Air Field and Seaplane Base," which has post-war plans calling for individual bungalow-and-hangar facilities for each pilot.

Completing our business, we turned northward. Over Chattanooga, Tenn., we saw intense haze and fog over the field there, indicating it was either closed or on instruments. From here on we kept a



Be a Licensed Engine or Airplane Mechanic in SIX MONTHS

All aviation repair stations must have *licensed* mechanics. Prepare now for your Engine or Airplane Mechanic's license at government-approved Roosevelt Aviation School. Ideally located for aeronautical training at historic Roosevelt Field. 16th year of unbroken operation.

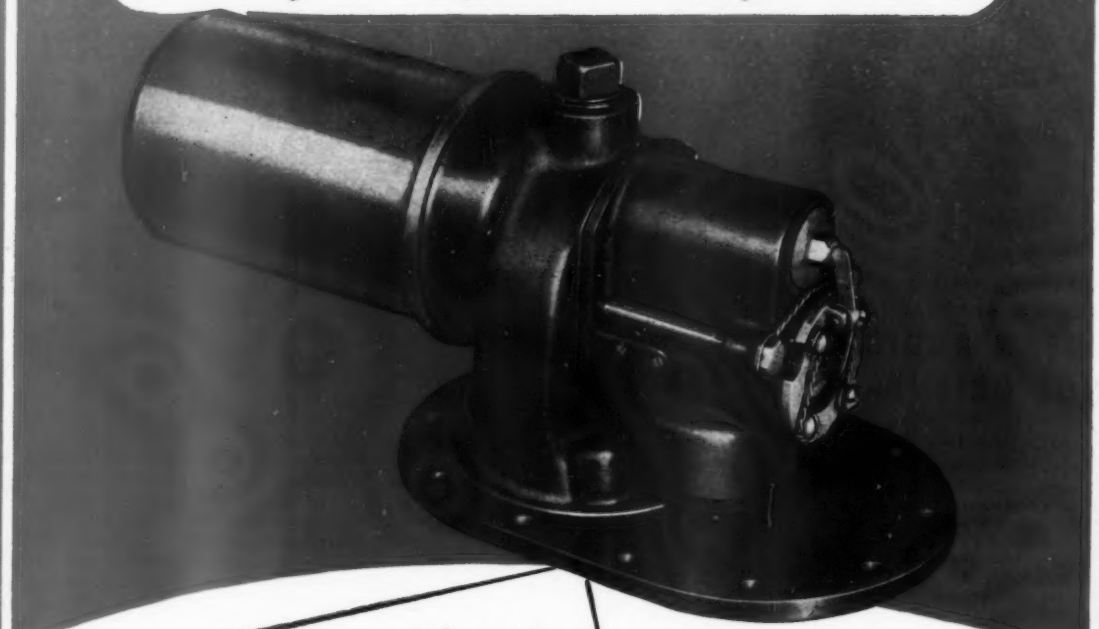
You may qualify in 24 weeks for either license (issued by C.A.A.) if 18 or over when you complete the course—or for *both* licenses in 48 weeks. Put yourself in line for better ratings after induction or an immediate preferred job in commercial aviation if not needed by Uncle Sam. ***If you are a discharged veteran and desire to continue your education under the G.I. Bill consult us.***

NEXT ENGINE CLASSES BEGIN JULY 9 & SEPTEMBER 4
NEXT AIRPLANE CLASS BEGINS JULY 16

ROOSEVELT
AVIATION SCHOOL
MINEOLA, LONG ISLAND, N. Y.
Phone Garden City 8000

Roosevelt Aviation School 5-45
Hangar 23, Mineola, L. I., N. Y.
I'd like to know how I can become a licensed Engine ☐ or Airplane ☐ Mechanic in six months or both ☐ in 48 weeks.
NAME..... AGE.....
ADDRESS .....

Steps up Horsepower



The New ROMEC

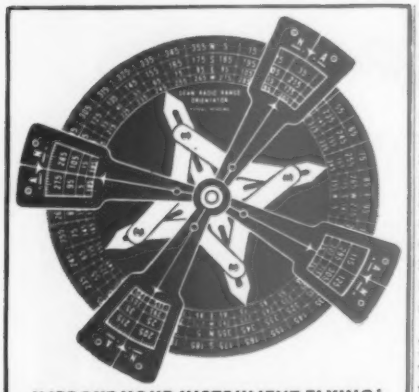
FULLY *Submerged* WATER INJECTION PUMP

Here is a fully submerged pump that gives aircraft engines an abundance of extra horsepower when needed in an emergency. No robber of valuable room, this pump requires less than 1½" space on outside of tank for mounting purposes. It supplies water or water-alcohol mixtures that are vaporized in the combustion chamber. The corrosion problem has been solved with special internal insulation as well as external contact insulation. Engineered for wide temperature ranges with heat being more quickly dissipated. This dissipated heat, together with agitation caused by relief valve discharging directly into tank, also greatly reduces freezing hazard. This new Romec Fully Submerged Water Injection Pump is also available with supercharger connections. Write for details. Illustrated is RD 8500A with supercharger connection.

Romec

ROMEC PUMP COMPANY

131 ABBE ROAD • ELYRIA, OHIO, U.S.A.



IMPROVE YOUR INSTRUMENT FLYING!
ACCURATE AND PRACTICAL

DEAN RADIO RANGE ORIENTATOR

and

TURN AND HEADING COMPUTER

The only instrument of its kind . . . **Gives constant visual picture of radio range. Instantly and Accurately** tells (1) Bisector Headings, (2) Time required for any given amount of turn, (3) Headings to fly during turn-around procedure, (4) Perpendicular heading to any selected beam leg, and (5) Right angle course to average bisector. Needed by every instrument pilot and student.

AVAILABLE AT LOCAL AIRPORTS EVERYWHERE

Price Only $10.00 Including CARRYING CASE

Distributed by

AETNA AIRCRAFT SALES & EQUIP. CORP.
6151 South Cicero Avenue, Chicago, Illinois
AERO SERVICE & SUPPLY COMPANY, INC.
Municipal Airport, Birmingham, Alabama
A. W. WHITAKER
P. O. Box 3820, Portland, Oregon
OMAHA AIRCRAFT COMPANY
Omaha, Nebraska
AERONAUTICAL TRADING CO.
179-20 Rockaway Blvd., Jamaica 5, New York
GENERAL AIRCRAFT SUPPLY CORPORATION
City Airport, Detroit 5, Michigan
NORTHERN AIR SERVICE
Grand Rapids 8, Michigan
AIR ASSOCIATES, INC.
Municipal Airport, Chicago, Ill.

or Write

AVIATION ASSOCIATES
664 N. MICHIGAN AVE.
Chicago 11, Illinois

AERONAUTICAL UNIVERSITY B.S. DEGREE IN 2 YEARS

FOUNDED BY CURTISS-WRIGHT

Prepare for key positions in Aeronautical Engineering, Drafting and Engine Mechanics. Preflight and short, intensive training and degree courses lay foundation for advancement in the growing field of aviation.

Veterans welcome. Co-educational. Day and evening classes. Send for free illustrated booklet—"Opportunities in Aviation."

Dept. 2, 116 South Michigan Ave.
Chicago 3, Illinois.

sharp watch for good emergency fields.

Finally the field at Cookeville, Tenn., came into view and we glided down for a landing. While being refueled rain began to fall, but since conditions seemed to indicate only a local shower, we continued north to Cincinnati. Although my passenger and I were keeping our eyes peeled for bad weather, in less than an hour everything seemed to close in and a 360° turn indicated the ceiling to be dropping fast in all directions. Having no desire to try out my hearsay knowledge of instrument flying, I picked a spot and made an emergency landing.

We were in between a series of high hills, in the heart of the "hill-billy" country. Almost before we could get out of the plane, people came running from every direction. Ours was the first airplane they had ever seen at close range and our visitors' timid approaches, ending with running an inquisitive finger over the wings and fuselage, were really something to watch. The nearest community of any size was Columbia, Ky., about 50 miles away—and not one of our visitors had been that far from these hills.

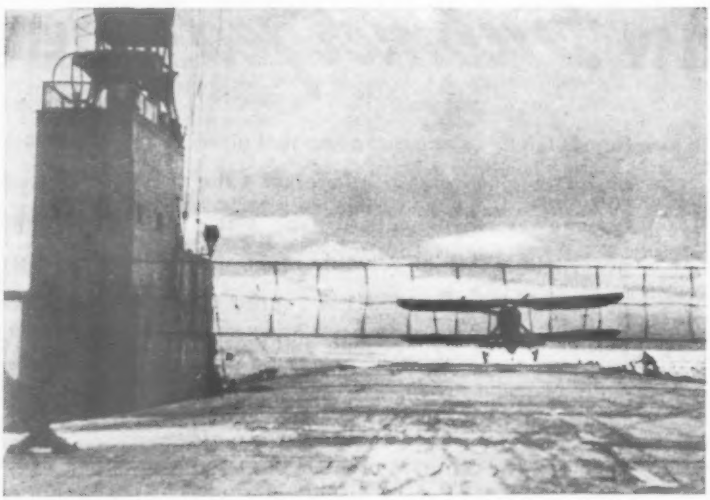
Later, the men aided our take-off by removing several sections of a barbed wire fence to give us room for the take-off run. We enjoyed our visit there but were glad to be headed for Lexington, Ky., our next refuelling stop. Little more than an hour later the horizon brightened and the overcast dissipated. From there to Cincinnati we had CAVU weather. In spite of our delays we were forced to wait at Watson Field, Cincinnati, for our field man to show up.

The following morning we took off for home, scheduling a stop in Marion, Ind., for gas and oil. A few hours later we landed on our home base.

We had covered a huge triangle in 16 days, satisfactorily conducted our business, and truly enjoyed every moment. Invaluable flight experience was gained in the every-day process of conducting business. To me this proved beyond any doubt the utility of the lightplane in aiding the average businessman.

Financially, the trip demonstrated sound economy. Our total time in the air was 45 hr. 25 min. at $6 per hour, or $272.50. Taxicabs in the larger cities, $3.50. Total: $276. My companion and I had covered all of our points at a transportation charge of $138 each, or approximately *three cents per mile*. We used 197 gallons of gasoline, traveled approximately 3,950 miles, and maintained a ground speed average of 86.4 m.p.h.

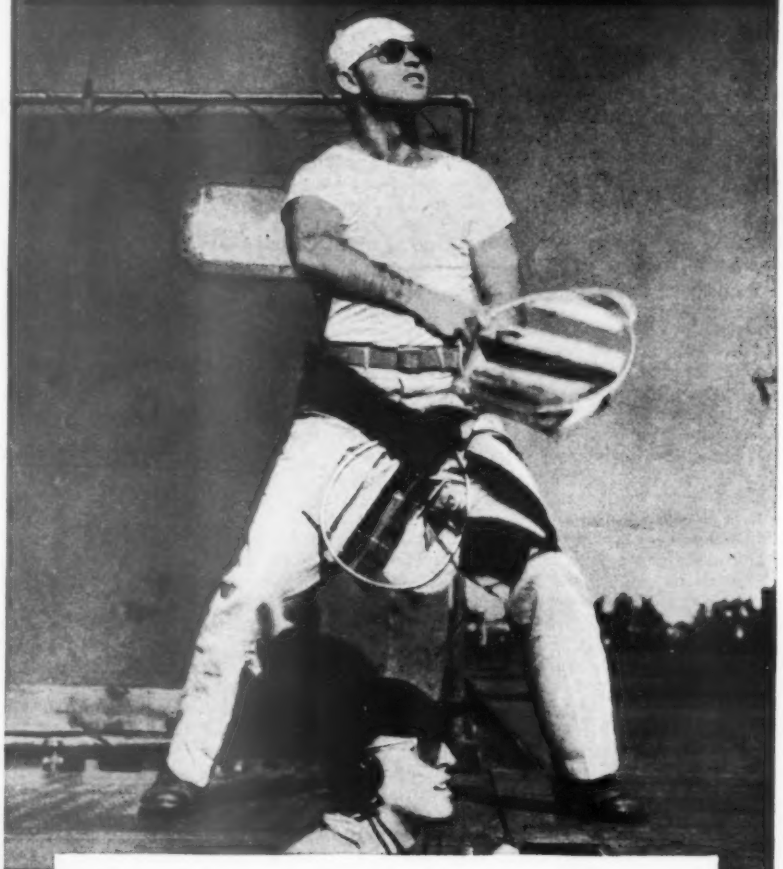
I recall very well the plight of a weary concert maestro who had unsuccessfully pleaded for space aboard a Miami-bound airliner during our preparation to hop off from Pensacola. My mind turned back to that night in Cleveland when I was "bumped" for that priority passenger. I know how many businessmen feel when the same thing happens to them. Perhaps some of them will turn to private flying as I did and take advantage of the freedom of the airways—plus that immeasurable thrill of being pilot, navigator and businessman all rolled into one. I believe aviation in general and private flying in particular has much to offer that man who wants safe, rapid and economical travel, and the self-satisfaction of knowing he belongs to this air age. END



PIGMY FLAT-TOP

ROCKET-EQUIPPED Fairey *Swordfish* makes a landing on one of the new "pigmy" flat tops which escort Canadian convoys. While the full story of this operation is yet to be told, it is known that the carriers are also cargo ships, fully loaded with wheat. They have a flight deck only 380 feet long and the pilots ordinarily need only 100 feet of the deck for landing and taking off the now obsolescent biplanes. Steel cable arresting barrier prevents planes from running off deck on landing.

MEN OF ACTION WEAR CALOBAR SUN GLASSES



YANK FIGHTING MEN know that sudden death may lurk in dazzling glare. To protect themselves, they protect their eyes ...get clear, sharp, split-second vision...with optically ground and polished Calobar Sun Glasses.

Specially formulated Calobar lenses admit plenty of "seeing" light . . . but they keep out blinding light, absorb infra-red (heat) and ultra-violet (sunburn) rays. Their frames are built for exceptional wearing comfort, maximum field of vision.

Production of Calobar Sun Glasses today is for Army and Navy aviation personnel only. After the war, they will be available to all, through those who give professional eye care . . . and to fliers from airport sources. Your fixed base operator will then be able to supply you.

Official U S Navy Photo

AO CALOBAR SUN GLASSES *Optically Safe*

American AO Optical COMPANY

World's Largest Makers of Ophthalmic Products

BUY WAR BONDS AND STAMPS

The question *nobody* can answer... about AO CALOBAR Flying Sun Glasses

When you know that the American Optical Company is making sun glasses for fliers today that combine, superlatively, *all* the best features of scientific glare protection . . . then naturally those are the glasses you want.

But when you know, too, that AO's all-out production of these precision sun glasses is *exclusively* for Army and Navy flying personnel . . . then naturally your next question is: *When* will they be available to civilian fliers?

That's the question nobody can answer!

Perhaps you ask: Will civilians have to wait till the end of the war for these glasses? All we can say is—maybe not. We hope not. For there is a possibility that as—and *if*—fighter demands relax sufficiently, then gradually increasing quantities may be released for civilian use. But please don't count on it!

You see—since *before* Pearl Harbor we've worked for and with Uncle Sam in developing, perfecting and producing this war-vital product. Since 1941, *over three quarters of a million pairs* have literally gone to war. After D-Day, one air command post's first order from the Normandy Beachhead was for 10,000 pairs. And government demands continue without let-up...demands we are pleased and proud to fill. We know that's just what you would have us do—gladly.

Behind AO's continuing war production lies a story profoundly significant to future civilian purchasers... a significance that can only be fathomed when these glasses are available to all.

For out of the painstaking research that went into the making of this specialized product . . . out of the vast resources of AO's laboratories and equipment, and its highly trained organization of over 13,000 skilled employees . . . will come the best, the *safest* glare protection science has yet devised . . . for the hundreds of thousands of fliers who will take to the air after V-Day. Sun Glass Division, American Optical Company, Southbridge, Mass.

"Mae West" Life-Preserver
USAAF Type B-4
(Slightly irregular)

To use, pull cord on CO_2 cartridge and preserver instantly inflates. Also can be inflated by mouth.

Each preserver has a dye-tracer attachment which, when released, makes a 25 foot yellowish-green fluorescent circle on the water around the wearer.

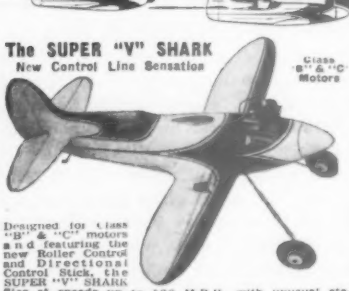
Price $12.50 including 2-$CO_2$ Cartridge.

(Write for list of many other Army and Navy items)

SCHOFIELD'S
FLYING EQUIPMENT
Commercial Square
East Weymouth 89, Mass.

SUPER G-LINE MODELS
Now Available

The SUPER "V" SHARK
New Control Line Sensation
Class "B" & "C" Motors



Designed for Class "B" & "C" motors and featuring the new Roller Control and Directional Control Stick, the SUPER "V" SHARK flies at speeds up to 120 M.P.H. with unusual stability and ease of control. The CONSTRUCTION KIT, complete to the finest detail, is now available at only $4.95. Plus 30c Postage
Descriptive Literature 5c

VICTOR STANZEL & CO., Dept. F., SCHULENBURG, TEXAS
First In Control Line Flying

How the Red Air Force Fights

(Continued from page 23)

control of the air. The Russians realize its importance but do not insist on it as a condition for lending aerial support to ground troops. They remember the bitter lessons of June, 1941, when German attack bombers surprised and destroyed hundreds of Soviet planes on airdromes near the front line. They seek to repeat that maneuver in launching their own offensives. But the Soviets realize that control of the air is usually relative. They do what they can to obtain it, meanwhile they go ahead and attack.

In last autumn's Baltic offensive the Soviets attacked more than 100 enemy air bases and destroyed upwards of 1,500 German planes. Fuel and ammunition dumps were destroyed. Five particularly important German air bases were raided more than 100 times. On one such raid the Soviets claimed they disabled 126 aircraft.

These airdromes were attacked at night with a pathfinder technique considerably different from that used by the British. Pathfinding crews with specially-trained pilots and navigators are assigned to the bombing group. However, instead of dropping marker flares to delineate the target for a saturation bombing, as the British would do, the Soviets drop flares of 2,000,000 candlepower each and use precision bombing techniques. In one raid on a rail marshalling yard at Breslau, 20 to 40 flares were used and the bombs dropped from 16,000 feet.

Another unusual procedure in these raids is that they are under the constant supervision of an operations officer who flies to the objective with the attacking force, watches the pathfinder planes drop the flares, and then observes the bombing. He maintains constant radio contact, directs the bombers from target to target, observes the enemy antiaircraft and routes the attacking planes to avoid it if possible, or orders a direct attack on the antiaircraft itself.

Gaining control of the air became an important objective of the Red Air Force in the Soviet invasion of East Prussia in January. More than 50,000 operational flights were carried out in East Prussia and western Poland within a short time despite poor flying weather. In one of the early days of the drive Russian pilots flew more than 5,000 sorties in groups of 125 and 150 planes. These air blows, coupled with the rapid advance of the ground troops, prevented the Germans from concentrating any large force of the *Luftwaffe*, and the Germans were even forced to move their air bases west onto one airdrome which was already mined.

Russian tanks seized many planes which the Germans had not time to fly, and the rare groups of German planes which did appear were soon cleared from the air. La-5's bombed German airfields heavily and added to the German air debacle. It is well to note here that the *Luftwaffe* was not knocked out by the Red Air Force alone, but by the simultaneous advance of the Red Army which seized the airfields. Each complemented the other both in the air and on the ground.

Consider now our AAF's second tactical priority—isolation of the battlefield. The Soviets have developed special techniques for knocking out highways, bridges, and attacking troop columns.

Flares are used for night tactical operations. A forest bridge constructed of century-old trees was destroyed by Soviet night bombers last spring just as German reinforcements were about to cross it to aid hard-pressed Nazi troops on the other side. The Germans had observed the Soviet bombers overhead by daylight and dispersed their forces intending to cross after dark. The Red bombers, meanwhile, delayed their attack until the Germans marshalled for the crossing. Then the bombers, assembled by radio, attacked by the light of the moon and flares. They destroyed numbers of tanks and self-propelled guns as well as the bridge.

In another case the Germans were withdrawing infantry and tank units across two bridges approximately 1,000 feet apart spanning a broad river. The advancing Red Army units hurriedly called for air support to destroy the bridges, since the Germans would be on high ground if they crossed but would be compelled to give battle on unfavorable terrain if they could be trapped in front of the river. Only three dive bombers were available but they successfully cut the bridges in a bombing run from about 2,500 feet. Ordinarily, under Soviet procedure, an operation against such narrow targets would have called for at least 30 bombers. The success of the mission is especially noteworthy because both were destroyed on the same bombing run—a complicated procedure that involved careful calculations of speed and angles.

A Red Air Force technique in attacking vehicle columns on the highway is explained by Capt. P. Zheltukhin, leader of a Stormovik section. The pilots are briefed on movement and location of the columns. Since such movements change rapidly, however, reconnaissance planes maintain a close watch. Concentrations are especially noted and the reconnaissance planes call in the attackers, usually in groups of four to 12 depending on the target, anticipated resistance and weather conditions.

The Germans often protect their large columns with mobile antiaircraft and fighter patrols. In these cases, the Soviet pilots fly a chain formation. When the flak is heavy some of the planes are detailed especially to attack the antiaircraft. Captain Zheltukhin prefers to choose his own time to hit the enemy and favors river or road crossings, or places where the terrain prevents the enemy from scattering. The Soviet flyers strike first at the head of the column, which causes the enemy to slow down or even come to a standstill.

Methods of direct attack vary but the most effective is to descend in a line at an angle of about 10° to 15°. When the flak

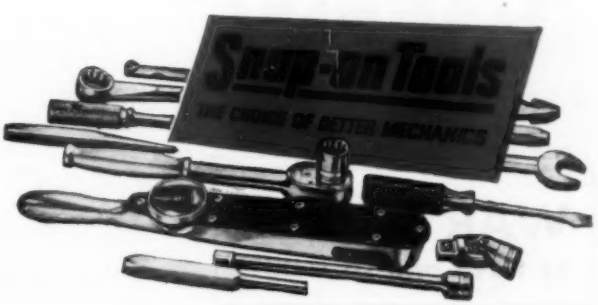
Exactly Right...
TO THE EXACT FOOT-POUND!

In many assembly and maintenance operations, tensioning studs and bolts *exactly right* is critically important. Distortion caused by inaccurate tensioning wastes power, promotes wear and is a frequent cause of mechanical failure.

With Snap-on Torqometers even inexperienced workers swiftly and confidently tension bolts to the correct foot-pound . . . and on delicate mechanisms, *to the exact inch-pound.* As the worker turns the nut he *sees* the tension increase — on the easily read dial . . . and stops at the specified pressure.

Snap-on Torqometers are widely used in aviation, and in other fields where precision in assembly and maintenance is essential to efficient performance. Torqometers are available in a full range of sizes from zero to 30 in. lbs., up to 2,000 ft. lbs. Torqometers are fully described in the new Snap-on catalog of 3,000 modern hand and power tools. Write for your copy.

SNAP-ON TOOLS CORPORATION
8024-E 28th AVENUE • KENOSHA, WISCONSIN



RELAX
with a
»MARXMAN«

BENCH-MADE
IMPORTED BRIAR

Typical of fine pipe craftsmanship by MARXMAN. Seasoned, imported briar, selected for beauty of grain, carved by hand into a pipe of rare charm . . . extra-large bowl, perfectly balanced . . . sweet, cool smoking!

MARXMAN makes superb pipes in all familiar shapes . . . in exclusive shapes . . . in all price ranges. Look for *MARXMAN* on the next pipe you buy!

Regular $5.00
Large $7.50
Massive $10.00

AT FINE STORES

»MARXMAN«
27 W. 24TH STREET, NEW YORK 10, N.Y.

The HELICOPTER
Looms big in tomorrow's transportation problems. Keep in touch with helicopter development and post-war plans . . . your name will be placed on mailing list FREE. Write today to
THE HELICOPTER GUILDSMAN
7614 Saginaw Avenue Chicago (49) Illinois

STAMMER?
This new 128-page book, "Stammering, Its Cause and Correction," describes the Bogue Unit Method for scientific correction of stammering and stuttering—successful for 44 years. *Free—no obligation.*
GET THIS FREE BOOK!
Benjamin N. Bogue, Dept. 5254 Circle Tower, Indianapolis 4, Ind.

WAR BONDS
To Have and To Hold!!

is heavy, however, the angle of attack may be increased to 25° to 30° in order to cut the time each plane must stay within range of the antiaircraft. The chain method is claimed to yield excellent results, permitting each flyer to maneuver freely, choose his own target, and strike with greater precision. The chain method also facilititates defense against the enemy fighter planes, Captain Zheltukhin claims.

When there are a great many fighters, the Soviets employ a star pattern of attack which they believe tends to distract the enemy's gunners. A variey of attack methods prevents the Germans from anticipating the maneuvers to come—flexibility of plan and method is a Red Air Force keynote.

An unusual situation in battlefield isolation occurred during the siege of Budapest in January, 1945. The German high command made desperate attempts to supply the beleaguered city by air and the Soviets claimed shooting down more than 200 combat aircraft which were trying to clear the way for Nazi transport planes to land in the Budapest area. Soviet fighters screened the city during the daylight hours and in the darkness their light night bombers bombed the fields on which the transports were trying to come in. This situation was somewhat different from that two years before at Stalingrad, when the Germans simply did not have the airpower to try to escort the transports through to Von Paulus' besieged army and more than 1,000 planes were shot down.

It is in the AAF's third priority—direct support of the ground troops—that the Soviet airmen seem to take greatest pride. In this winter's invasion of East Prussia the main effort of the Soviet aircraft units was directed to supporting tanks and infantry fighting deep in the enemy defense zone. They were particularly active during enemy counter-attacks.

Assaults against strong columns of enemy tanks were carried on by the two main types of attack bombers—the Tupolevs and Petliakovs—operating in waves. These bombers did fine work diving on enemy targets.

Colonel Denisov describes an attack in August by La-7's and Yak-9's against a small sector of about 10 square kilometers. This small area was first delineated by shell and trench mortar fire while a covering force of about 130 Soviet fighters patrolled the square. Soon the bombing force appeared, led by squadrons of Pe-2's which dive-bombed the positions, followed by 175 bombers. This was not a saturation bombing but a precision attack, each bomber selecting an individual target. While the bombers climbed to repeat the attack, 200 Stormoviks flying low raced in. The assault was repeated several times and when the air remained clear of enemy fighters the Soviet fighters joined in with a low machine gun and cannon strafing attack. Stormoviks and fighters then ran in again. Altogether, the attack by about 500 Russian planes continued for two hours.

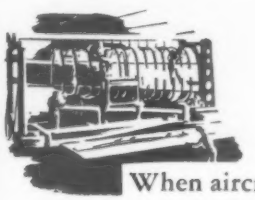
The Stormovik, which is not the name of a plane but merely of a type of "attack" plane [a literal translation is "stormer"], most nearly represents the Russian concept of air-ground support. The Ilyushin Stormovik is a two-place plane, heavily armed with cannon, machine guns and bombs, and designed for direct assault upon the enemy's fixed ground positions and his armored ground forces. Critics who point to the Il-2's comparatively slow speed are apt to over-

FLYING
"Lieutenant, sometimes I question the strategic value in the location of this gun."

"COMPLETE"

is the word for Doak!

DOAK AIRCRAFT CO., INC.



When aircraft parts or assemblies are turned over to Doak for manufacture, the entire production job is done right here. For the Doak plant is a complete, self-contained metal-working factory with all necessary processing departments. A "plus factor" at Doak is the long background of our key personnel in aviation... all of whom have at least 15 years experience in aircraft production. The result of these specialized facilities and "know-how" has been a source of keen satisfaction to the prime contractors we serve in the maintenance of volume quality-production on schedule and in the development of many cost-cutting production short cuts. Doak Aircraft Company, Inc. Torrance, California.

MANUFACTURERS OF COMPLETE AIRCRAFT ASSEMBLIES

What you do with your money can wreck you (*and your Uncle Sam*)

BUY, BUY, BUY! Foolish people are doing it, *over*doing it. But sensible folks know that with every needless purchase—or every time you patronize a black market or buy above ceiling—you do your bit to force prices up all along the line. That's the way inflation gets a boost.

IT CAN HAPPEN HERE—again! Today, with fewer goods in the stores while incomes are high; the danger of inflation is greater than ever. Inflation is always followed by depression. What can you do to head off another depression? Buy nothing you do not really—*really*—have to have . . . today.

SAVE, SAVE, SAVE! That's the way to make America good for the boys to come home to. Pay up debts, put money in life insurance, savings bank, War Bonds. Every cent you save now helps to keep prices down—and when the war is won you'll have use for that nest egg you've laid away.

A HOME OF YOUR OWN, a better farm, a real vacation, something to retire on—these are things worth saving for. Store up your money now while prices are high. There's a time to splurge and a time to save: today, while money's coming in, is a good time—the *right* and patriotic time—to SAVE!

4 THINGS TO DO

to keep prices down and help avoid another depression

1. Buy only what you really need.
2. When you buy, pay no more than ceiling prices. Pay your ration points in full.
3. Keep your *own* prices down. Don't take advantage of war conditions to ask more for your labor, your services, or the goods you sell.
4. *Save.* Buy and hold all the War Bonds you can—to help pay for the war, protect *your own* future! Keep up your insurance.

HELP US KEEP PRICES DOWN

A United States War message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in cooperation with the Magazine Publishers of America

look the revolutionary weight of armor plate it carries. The engine is sheathed in armor and the entire forward section has tough steel armor plate. The windshield is composed of nearly three inches of bullet-resisting glass and the entire fuselage section from the rear gunner to the tail is of plywood construction covered with armor plate.

The Stormovik speedily caused a revision in Nazi General Guderian's theories of tank warfare. Stormoviks have found wide use as a countermeasure against tanks and infantry on the battlefield and for attacks on enemy airdromes, communications and sea transport. They are also being used to give direct support to attacking infantry.

The existence of the Stormoviks sheds considerable light on the requirement to which our AAF gives first tactical priority—gaining control of the battlefield. The Stormovik is too slow to be a good fighter plane—it cannot dog-fight with the high-speed German fighters. Therefore this all-important Russian design cannot be used to clear the air of enemy fighters. While its armor has given it great protection, the chances are it cannot stand up directly against the newer cannon-carrying German fighters. It remains successful, nevertheless, because the Russians now give it a fighter-escort if necessary, and also because it operates primarily from 500 foot altitude down to treetop level. Here it is a difficult target to see and, because of its heavy armor and rear-seat gunner, a formidable one to engage. The I1-3 represents an improvement over the model pictured on the accompanying pages. It has a more powerful engine and the gunner now has a separate cabin.

In breaking through the Mannerheim line to Finland, I1-2's cleared the way for tanks and attacked enemy artillery positions. When tanks were being held up by enemy fire they would often themselves direct the Stormoviks against specific strongpoints. On the same mission such planes have bombed tanks, then risen to break up German fighter and bomber concentrations aiming at the Soviet rear, then returned to bomb the tanks again. This versatile aircraft has even been used as a photoplane.

The Stormovik, with its pilot and gunner, represents a different concept of an attack and ground-support plane than any conventional U.S. Army fighter. Our own high-speed fighter-bombers were originally designed for an entirely different kind of job than they now find themselves doing. Only when the war is over will it be possible to appraise fairly the Russian emphasis on tactical air support in comparison with our own emphasis on strategy. END

NOTAMS—Aviation's News Service

(*Continued from page* 53)

advisory area—in other words, a non-contact but up-to-date aeronautical chart each week. These charts, furthermore, not only indicate whether there is an airport at Oshkosh, Wis., but also give its size (length of longest runway), state whether the runway is paved, give its elevation, degrees of field lighting and servicing available, and frequency of airport tower.

A new feature of the charts is the circular symbols indicating hazardous temporary conditions. These symbols (called flags) are depicted by white R's (for red) and white O's (for orange) in a solid black background. Red flags indicate extremely dangerous conditions, such as a field closed or abandoned, a range inoperative or a change of range frequency, etc. The orange flags indicate hazardous conditions that call for caution but do not render the field or navigational facility unusable.

This "flagging" of hazardous conditions evolved from AAF war-time needs for a composite, up-to-date aeronautical map covering an area lying within a 500-mile radius of each Army airfield. On this map were spotted every aeronautical facility and danger area activated as of the date of the chart (regional). The operations people were to add, after studying Wenoa, all newly commissioned facilities and activated danger areas or to delete abandoned ones. Finally, temporary hazardous conditions were to be depicted by small flags pinned to the facilities concerned. A red flag would indicate a very hazardous condition, an orange flag would indicate one merely calling for caution.

Because of poor visibility of the flags and because pilots in studying flags on one portion of the chart accidentally brushed off those on other portions, the system did not work.

The next step was a series of Weekly Notice Charts on which were depicted nothing but encircled R's and O's. The R's were subbing for the red flags and the O's for the orange. Only those airports and radio aids covered by "flags" were named.

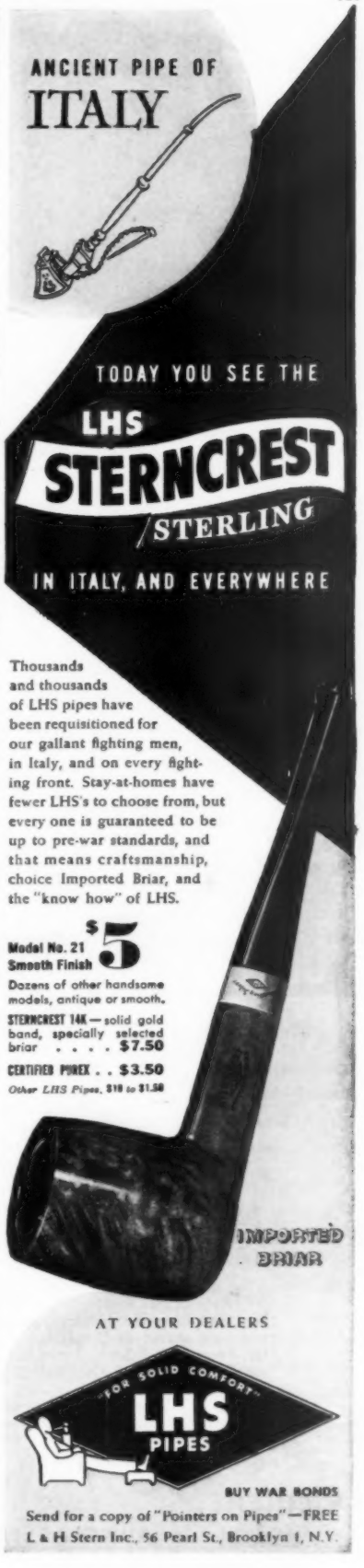
The final step was the present flight planning chart which includes every aeronautical facility with the current status indicated by the encircled R and O "flags."

By referring to these flags, or encircled R's and O's, no matter whether pilot is flying with the aid of a sectional map, an air navigation radio aid, or a Weekly Notice to Airmen chart, he seldom need refer to the printed portion of the notices because, if he refers to the charts and finds no flags along his route, there is no necessity for him to refer to the 30 or 40 pages of printed notices following the Special Notices.

Each Wenoa is published only after over 1,000 letters, telegrams, engineering reports, teletype dispatches and telephone calls from all over the nation have been checked and edited weekly.

Checking has proved the most important part of the job. There have been weeks when up to 20 per cent of the submitted data proved erroneous. Some weeks this percentage has dropped down to less than five but errors constantly creep into the unchecked data.

Samples of errors include co-ordinates that would place a radio range in the


ANCIENT PIPE OF
ITALY
TODAY YOU SEE THE
LHS
STERNCREST
STERLING
IN ITALY, AND EVERYWHERE
Thousands and thousands of LHS pipes have been requisitioned for our gallant fighting men, in Italy, and on every fighting front. Stay-at-homes have fewer LHS's to choose from, but every one is guaranteed to be up to pre-war standards, and that means craftsmanship, choice Imported Briar, and the "know how" of LHS.
$5
Model No. 21
Smooth Finish
Dozens of other handsome models, antique or smooth.
STERNCREST 14K — solid gold band, specially selected briar $7.50
CERTIFIED PYREX . . $3.50
Other LHS Pipes, $1.00 to $1.50
IMPORTED BRIAR
AT YOUR DEALERS
"FOR SOLID COMFORT"
LHS
PIPES
BUY WAR BONDS
Send for a copy of "Pointers on Pipes"—FREE
L & H Stern Inc., 56 Pearl St., Brooklyn 1, N.Y.

THE PARIS SUNBEATER

TYPE S-1
KHAKI TWILL, 1.25

Above the clouds or below, anywhere the sun strikes, you'll find the Paris Sunbeater, Original Long-Visored Flying Cap, shading the eyes of smart flyers. Green flannel under visor; embroidered eyelets; leather sweatband with Morse code.

BE SURE TO GIVE HEAD SIZE

Dealers Write for Discounts

ROY PARIS

1514 MAIN STREET • DALLAS 1, TEXAS

P.S. There are other Paris Sunbeaters, too, you know!

Type S-2, "Red Devil" Twill . . 1.25
Type W-1, Air Corps Gabardine, 1.50

*OCULENS SUNGLASSES

. . .The natural aid to better performance in all sports! Restful OCULENS Sunglasses filter out harmful, strain-producing direct and reflected sun rays. Prevent that hard, drawn, tired look — Buy a pair of OCULENS at your favorite store today.

Eliminate Sun-Squint, Sun-Blur, and Sun-Glare without MASKING Clear Vision and True Color Values. OCULENS Sunglasses meet U. S. Army specifications for absorption of infra-red and ultra-violet rays.

Oculens * Trademark Comptone Company, New York
CLEAN VISION SUNGLASSES

ocean, a Texas airport in Ohio, a bearing from a range station to an airport that would place the airport on the north leg when it is on the south leg, an obstruction on a north-south runway when there is no north-south runway, a control tower on a field that is undesignated and with no servicing or attendant available, an A quadrant in the space reserved for an N, an elevation of 2,000 feet for a sea-level airport, a southern Florida airport closed by snow, and a Chicago airport closed by snow and ice for over a week. The latter two examples were undoubtedly mechanical errors. Most likely the teletype "garbled" the station identification letters in some way as these were submitted in the form of teletype dispatches. It must be noted again, however, that only about 25 per cent of the Weekly Notice to Airmen source material is teletype dispatches.

Wenoa is divided into three sections, namely, the printed Notams or textual portion, sandwiched in between the Flight Planning Charts (making up the first 54 pages) and the supplement.

The printed Notams, or textual portion, list first of all the Special Notices which are generalized in nature or of too great importance to change overnight in the alphabetical state listing of Air Navigation Aid Data. Following are the captions of some Special Notice excerpts from a recent issue: (1) "Army and Navy Fields Closed to Civilian Flyers"; (2) "Emergency Procedure for Aircraft Forced Down at Sea"; (3) "Emergency Flight Rules Revised"; (4) "Very High Frequency Airway Voice Installations"; (5) "Sale of Aeronautical Charts"; (6) "Instrument Approach Procedures"; (7) "Flight Progress Reports"; (8) "Aeronautical Chart Corrections"; (9) "Civil Flying in Western Air Defense Zone."

After the Special Notices are carried, listed alphabetically by states, the Air Navigation Aid Data, such as the commissioning of a new field, a lengthened runway, the current availability of repairs and 80 octane, the reversal of range quadrant identification or change of frequency, addition of voice facility, temporary field or radio conditions such as, "field soft," "runways closed because of construction," or "control tower inoperative."

Items covering temporary conditions are carried only as long as the conditions cited are in effect. When a hazard no longer exists the citation covering it is dropped from Wenoa. The assumption can normally be made that, if there is no citation covering a particular airport or radio facility, the facility is in serviceable condition as of Wenoa's deadline.

Items covering new airports and radio aids or revised data on existing facilities are carried in only one issue of the Wenoa text because the Wenoa flight planning charts immediately reflect these new facilities or revisions.

While a glance at the charts will give one an up-to-date picture of every active aeronautical facility in the country, there are records-keeping and operations personnel who are interested only in those changes that have occurred since the last issue of Wenoa. To save their time, and to facilitate immediate reference to such "permanent" changes, the practice of prefixing a large black star or two asterisks to these changes was adopted. The large black star indicates changes in radio facilities. The two asterisks indicate changes in airport, danger area, or miscellaneous data.

The supplement generally consists of eight to 12 pages of tear sheets which are supposed to be extracted from the Wenoa for insertion into other publications or for bulletin board posting. For example, the supplement recently included a listing of the aviation fuel octane available at all Army Air Fields, an index of all the aeronautical charts of the Coast and Geodetic Survey, an index of all "Danger Areas" charts, four new danger areas charts, and a listing of all control airports.

Headquarters, Army Air Forces, in an official release, states: "We consider the Weekly Notice to Airmen our Bible as far as our U. S. operations are concerned. It is standard equipment at all of our operations offices, and all pilots are required to check it before take-off . . ."

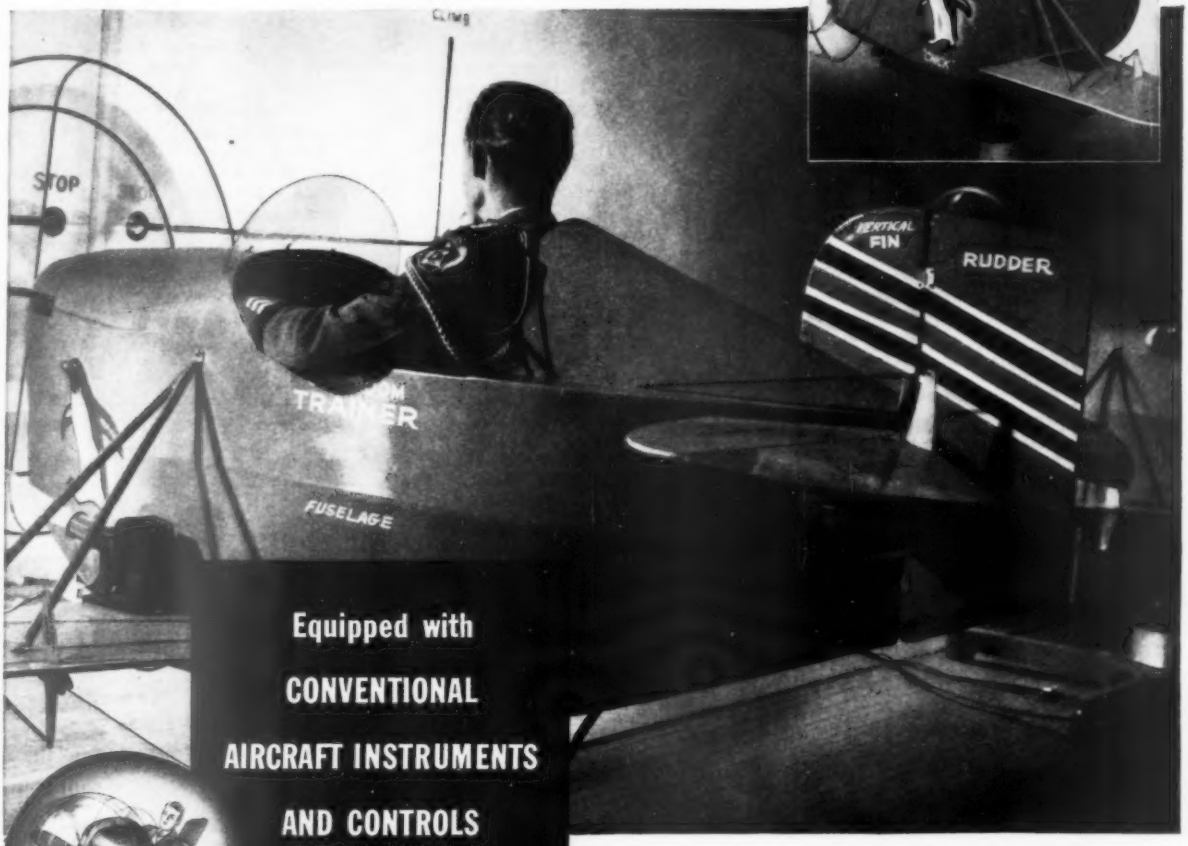
Wenoa is published in Washington. Its editorial rooms are in a converted garage on Fourteenth Street, NW. The publication is multilithed to keep costs at a minimum and avoid the delays encountered in war-time printing. Before reproduction, editorial clerks sift the various source material into airport items, radio items, lighting items, danger items and miscellaneous items. Assistant editors, with photographs or sketches of the various facilities in front of them for reference and checking, break down each category into two sections: items requiring no check, e.g., field soft, field closed, and those requiring check, e.g., lights inoperative (does the field have lights or has an erroneous designation crept in?), the coordinates of a range station, and its bearing and distance from the associated airport. One group of writers compiles nothing but temporary items, such as fields under construction or beacon and range outages. Another group compiles what we term "permanent" items, such as new ranges or new airports or additional or revised physical data on existing airports.

After this material has been sifted, the "permanent" items are routed to the compilation unit which sets them up in suitable form for the charts. This unit maintains a complete directory of all data on each chart which is revised daily with data submitted by airports and radio facilities units. Revision sheets for each chart are then prepared and routed on to the drafting unit, which performs the actual cartography as well as the placement of flags. This "flagging" is delayed until Wednesday evening, with a few finishing touches added about 5:30 a.m. Thursday to cover the teletype dispatches received overnight. No coverage of new facilities is made after 0001 E.W.T. each Thursday but hazardous conditions or abandoned facilities are included if advice comes before the 11:00 a.m. Thursday deadline. This is on the theory that non-knowledge of a new airport (or new range) rarely affects a flyer adversely, whereas non-knowledge of an abandoned airport or range could quite conceivably do so.

"Permanent" civilian data for all flight

Teach Aviation Preflight this new, modern way with the Penguin

PREFLIGHT CLASSROOM TRAINER



Equipped with CONVENTIONAL AIRCRAFT INSTRUMENTS AND CONTROLS

Penguin Preflight instruction is basic and thorough, thus making it possible for student to obtain Private Pilot's license in less than average time.

Daily Preflight instruction is now being offered to men and women at our Chicago School classrooms. If you live in the Chicago area you are cordially invited to stop in and see a demonstration of these Penguin Preflight Trainers.

Simulates All Attitudes of Flight

Penguin, the only practical training plane for teaching basic preflight is now available for classroom instruction. The plane is designed to assume all flight maneuvers; straight and level, climbs, glides, stalls and spins.

Camera projector placed on left wing of plane projects a silhouette on a panorama screen. The student, by the co-ordination of stick and rudder, is required to control projected silhouette along the charted lines of fundamental flight maneuvers. This teaches the student by visual observation to simulated ground and sky screen, the various attitudes of the aircraft in flight. Powered by fractional horsepower motor—propeller guard for added safety. Low Cost.

Write for information on prices and specifications.

PREFLIGHT SCHOOL *division*
Lewis School of Aeronautics

Dept. F-5 235 S. Wabash Avenue, Chicago 4, Illinois

You can have one—NOW!
REGULATION A-2
Army Air Force Flight Jacket
ONLY $19.95
POSTAGE PREPAID

The same official Flight Jacket worn by America's Top Pilots, Bombardiers, Navigators and Flight Personnel. ALL-LEATHER — windproof, rainproof, light in weight but extra warm. To order, give your height and suit size. Color is Dark Brown. Send money order or check only. Money-back guarantee.

NOTE SPECIAL FEATURES!
Solid brass zipper. Pure wool cuffs
Water repellent lining and waistband.
Safety snap collar and pockets.

PERRY SALES CO., DEPT. F-5
37-47 82nd St., Jackson Heights, N. Y.

Enclosed is $19.95. Suit size..... Height.....
Name.....
Address.....
City.....Zone.....State.....

MAIL YOUR ORDER TODAY!

"Riding a HARLEY-DAVIDSON — Thrilling as FLYING"

FROM Cpl. Richard K. L., on the flying front, comes this letter: "Entered the Air Force two years ago, and have had my bit to do with motorcycles. *There's as much thrill riding a Harley-Davidson as there is to flying.* I fly quite a bit but I hope for a Harley-Davidson again soon."

You're right, Cpl. Dick K. L., and that's the hope of lots of fellows like you. Plan now to have a new Harley-Davidson of your own in the fun-packed motorcycling years to come!

HARLEY-DAVIDSON MOTOR CO.
Dept. F Milwaukee 1, Wis.

Write for free copy of ENTHUSIAST MAGAZINE filled with motorcycling pictures and stories.

HARLEY-DAVIDSON MOTORCYCLES

information publications are gathered by a large staff of regional CAA Federal airways service and airports service engineers. The Navy Bureau of Aeronautics and the Army Air Forces gather similar data for all naval and military installations and submit them to us for co-ordination, compilation and publication. The temporary items pour in to us from airport managers, Army and Navy operations people, CAA airways and airports people, and civilian interests in general.

Frequently an Army Air Field's supply of Wenoa has been unloaded from an ATC plane less than 24 hours after the copy was distributed to the typists the previous 5:30 a.m.

The Weekly Notice to Airmen has proved its utility. It's a good deal like the "darn good-hearted cow" in the old Will Rogers story—practically everything a pilot needs in the way of pre-flight data is there for the asking. But, you *do* have to read it.

When war started, Wenoa was expanded for the Army and Navy and was no longer available to private flyers. The CAA then rushed into being a civilian version of the Weekly Notice to Airmen. This version, while also restricted, gave no coverage to purely Army and Navy facilities or to Army or Navy activities on civilian fields. It had no flight planning charts, but it did give the private flyer something to munch on until the restrictions could once again be removed. It did give him a chance to avoid newly-created danger areas and the risk of being shot down.

This civilian issue now has been discontinued. The whole, charted Army and Navy Weekly Notice to Airmen is now available to private flyers.

This does not mean that any pilot can now get subscription-free Wenoa, owing to the paper shortage and budget limitation. But all requests from a flyer who submits proof of a currently valid airman certificate, and from others furnishing proof of loyalty and of their need for Wenoa in the public interest, are given careful consideration.

Post-war expansion will probably lead to paid subscriptions. In the meantime, the supply—which, it is anticipated, will jump this summer from 20,000 to 60,000—will be distributed where it can do the most good for the most flyers. END

London Letter

(*Continued from page* 56)

He converted the figure and gave a just measure. Others were less scrupulous.

Is it not time that British and American aviation turned to the rational metric system and gave up their confused and confusing measures? The metric system is the system of science and of common sense. It is the system of the greater part of the world, including Soviet Russia. Anglo-American aviation would benefit by adopting it.

Correct comparison showed that the American Berlin attack was in fact the heaviest daylight attack on that city. The Germans did not put up a big fighter defense effort and few of their Messerschmitt Me-262 (jet) or Messerschmitt Me-163 (rocket) fighters were seen.

RAF Slang

Eric Partridge's "Dictionary of RAF Slang" (Michael Joseph) is the first work on this subject by a specialist. Mr. Partridge, author of "Slang—A Study and a History," "Words, Words, Words" and assistant editor of the "American Tramp and Underworld Slang," is serving in the RAF.

Sidelights on the relationships between British and American aviation humor can be found. I have heard an emergency parachute jump referred to by United States airmen as "taking a powder" and "hitting the silk." The RAF term in Partridge's dictionary is: "to jump out of the window." Another RAF phrase popular during the Battle of Britain was "leaving the building."

One good RAF slang term is missing from the dictionary; "thrash," meaning a dance. An RAF man who dislikes dancing will say that "thrashes are a bind."

Here will be found the meaning and derivation of "bind" (to bore), "gone for a Burton" (dead—a Burton being a kind of beer), "the beer lever" (the control column), "a body snatcher" (stretcher bearer), "a piece of home work" or "a piece of knitting" (a girl friend), and a "fruit salad" (many medal ribbons).

Ten-Blade Propellers

Many propeller experts have been trying to guess where airscrews end and jets begin. Recoil drives gain over propellers more and more with every speed increase. Most widely-accepted guess of the point where propellers must make way for jets is about 500 m.p.h. R. H. Coverley, controller of Rotol Limited, the airscrew company which was formed by Rolls-Royce and Bristol in combination (hence the name) believes the figure will prove to be 700 to 750 m.p.h.

Up to this speed he sees future opportunities for the propeller, no matter how rapid the advances in recoil drives. Airscrews can be built, he says, to absorb up to 7,000 h.p. from a single unit or from coupled units, whether arranged in tandem or otherwise.

Coverley, formerly with the experimental department of Rolls-Royce, was brought into the Ministry of Aircraft Production by Lord Beaverbrook to boost engine output at the time of the Battle of Britain. When released he went to Rotol. Big, slow and quiet-spoken he has often guessed right in the past. For the big engines of the future he foresees 10-bladed contra-rotating airscrews. (Rotol already has contra-props on *Spitfires*). Irreverent RAF comment was that a four-engined bomber with 40 blades, 20 turning one way, 20 the other, would look like a mincing machine.

British Overseas Airways

The expected Parliamentary statement about British Overseas Airways, the British Government's "chosen instrument"—

(*Continued on page* 144)

OPENS BUSINESS IN ALASKA

"For the past month I've been building a place to install the Alaska Instrument Repair Company'.... I shall soon put up my test equipment and work benches. So you see your pupil is going to try to utilize the knowledge gained at A. S. A. I.... I'm certain that the instrument field will pay off".

Bob Claus
Fairbanks, Alaska

Airliners are constantly checked, serviced and repaired when necessary.

Instruments are the mechanical nerves and brains of airline operations.

ADVANCED BY AIR LINE

"I am working for our 'home town' airline, and I might say, it is a swell company to be working for. Starting the 16th of this month, I was placed in charge of the line service with another raise. I sure am proud of this, and certainly want to thank the school for my education in this line of work".

Bob Safarik
Denver, Colorado

Join these men in good jobs as... SKILLED INSTRUMENT TECHNICIANS

Responsible well-paid positions... with airlines, Civil Service, as inspectors, with instrument manufacturers and on local airports... are all available to trained Instrument Technicians. Future flight will depend almost entirely on a multitude of instruments

...for pilot, navigator and flight engineer. Skilled men will be needed to install, test, service and maintain all these new instruments. You can plan your future career in this interesting, permanently profitable field of Aviation. Come to Los Angeles where the American School of Aircraft Instruments gives you all necessary training quickly but thoroughly. Here you learn instruments from men who know this industry and how to give you the training that employers want. A. S. A. I. has the advantages of complete, elaborately-equipped shops right in the heart of the Southern California aviation industry... a Civil Aeronautics Administration approved repair station, No. 1028.

Whether you want a "top flight" position with an airline or in government service... or the security of a business of your own at your post-war community airport... now is the time to start your preparation for a career as a specialist in Aircraft Instruments. Send today, for the interesting 24-page booklet that tells you about this fascinating field and the A. S. A. I. program. Get ready now to join the successful Instrument Technicians who have cashed in on their A. S. A. I. training.

FREE 24-PAGE BOOK

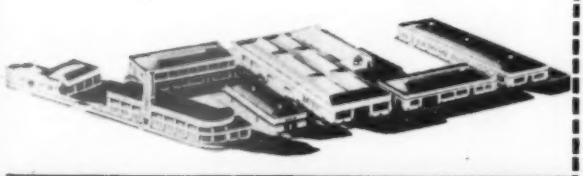
AMERICAN SCHOOL OF AIRCRAFT INSTRUMENTS — DIVISION OF

AERO INDUSTRIES TECHNICAL INSTITUTE

Herbert W. Hartley, Pres.

5255 W. SAN FERNANDO ROAD, DEPT. F5,

LOS ANGELES 26, CALIFORNIA



VETERANS! ASK ABOUT TRAINING AVAILABLE TO YOU UNDER G. I. BILL

AMERICAN SCHOOL OF AIRCRAFT INSTRUMENTS
5255 W. San Fernando Road, Los Angeles 26, Calif., Dept. F5

Gentlemen:

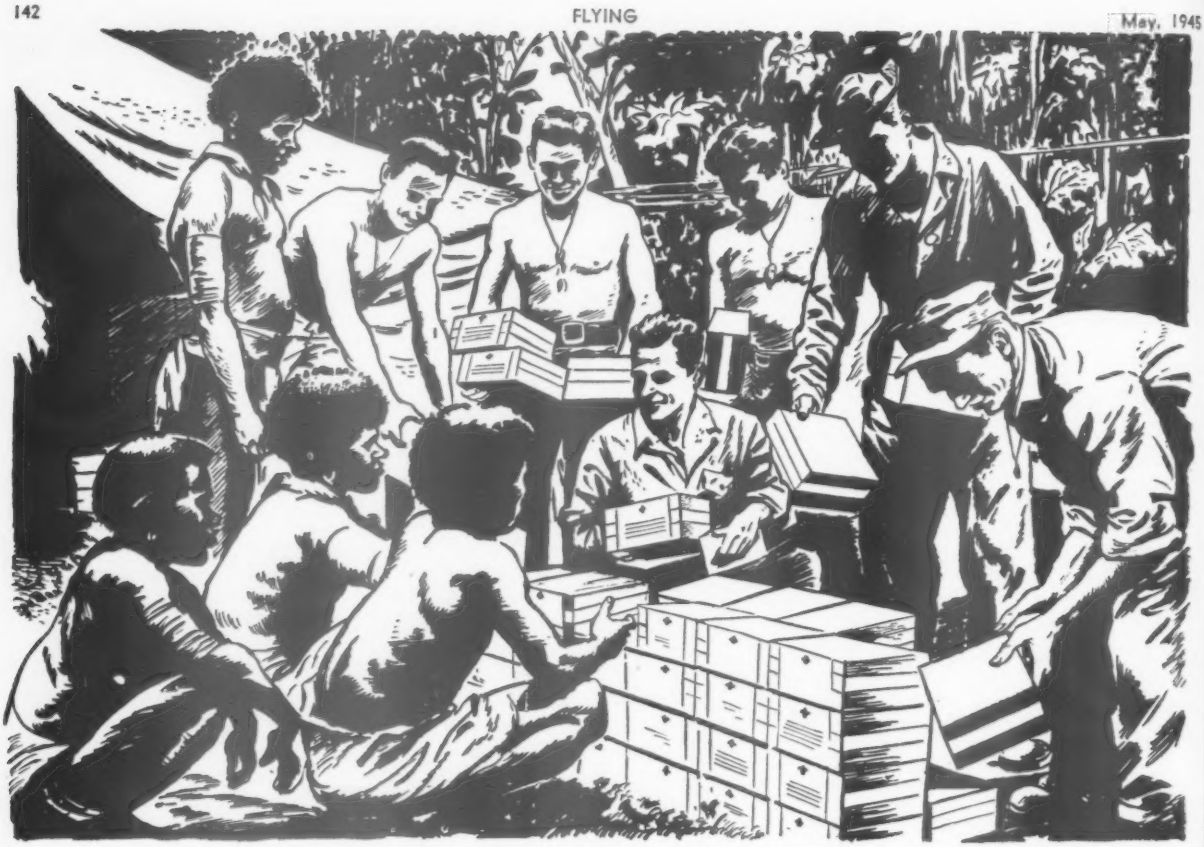
Please send me your 24-page illustrated Booklet and full information about your Master Instrument Training Course at Los Angeles. I am interested in learning how to become an Aircraft Instrument Technician.

Name_____ Age____

Address_____

City_____ Zone____ State____

Check one — ☐ In Service ☐ Veteran ☐ Civilian



Every jar of life-saving blood plasma must be protected against breakage in its long journey to the front. A blood plasma box takes a half-pound of salvaged paper.

But plasma boxes are only one of seven hundred thousand items made or wrapped with paper and needed daily by our fighting men. There's no such thing as *waste* paper any longer — it's all *V* paper today!

Look over your shelves, go through the back room, the storage space, the basement of your store — collect all the paper you are not actually using. Turn it in — and keep on turning it in. And remember, use as little paper as possible — paper's scarce these days and likely to get scarcer.

HOW MANY BLOOD PLASMA BOXES ON YOUR SHELVES?

If you sell your paper, you have a chance to do a good turn that will give you great personal satisfaction. Many individuals and organizations are today channeling a part of their waste paper proceeds to give wounded veterans those little extras that make such a whale of a lot of difference to a man laid up in a hospital. Or often the money is used for other worthy community projects.

Back the Double V Program — Save Paper!

DOUBLE V PROGRAM
SAVE WASTE PAPER
V TO SPEED VICTORY
V TO AID VETERANS
OR LOCAL PROJECTS

Newspapers: Fold them flat (the way the paper boy sells them) and tie them in bundles about 12 inches high.

Magazines and Books: Tie them in bundles about 18 inches high for easy handling by collectors.

Corrugated and Cardboard Boxes and Cartons: Flatten them out and tie them in bundles about 12 inches high.

Wastebasket Paper (Wrappers, Envelopes, Etc.): Flatten and pack in a box or bundle that can be carried.

Prepare for a BRILLIANT PEACE-TIME CAREER

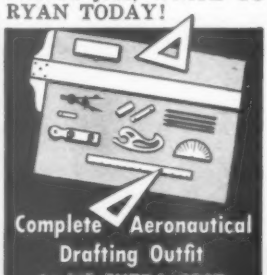
Learn AIRCRAFT DESIGNING and ENGINEERING

Sensational Peace Time Developments of New Planes Mean New and Greater Opportunities

Ryan

Get Training Direct From The Industry

R.A.I. training is based on both scientific theory and practical experience. From R.A.I. you learn the fascinating facts of aerodynamic science, plus the wisdom gained by Ryan experts in many years of practical application of those facts. For R.A.I. is affiliated with the famous Ryan School of Aeronautics, where thousands of both civilian and fighter pilots have been trained, and with the Ryan Aeronautical Company, pioneer manufacturer of many famous airplanes. If you want the best training to prepare yourself for the best aviation jobs, WRITE TO RYAN TODAY!



You get this complete, professional drafting equipment set without additional charge. There is nothing else to buy—no extra costs to bother you as you progress toward your valuable diploma—your ticket to a new, exciting, high paid career.

RYAN'S New Home Study Course Trains You in Spare Time

New planes require new plans—plans that you may help perfect. The thousands of new airliners, cargo planes, pleasure craft, sporting planes, can't be manufactured until designs and plans are prepared. There'll be a huge need for trained designers and draftsmen to turn out the tons of blueprints required.

YOUR PLACE IN THE "AGE OF FLIGHT"

It is agreed by experts that the aircraft industry will be one of the largest, most progressive and fastest growing of all future industries. Prepare now for one of these exciting, well-paying positions through home study training—the RYAN WAY. Previous training is unnecessary. You learn at home in your spare time, under individualized supervision. Lessons are so easy and interesting that many earn the coveted Ryan diploma far ahead of schedule.

DO THIS—THEN JUDGE FOR YOURSELF

You owe it to yourself to see that the study course on which you spend your time is the finest—the most practical. So use this coupon—NOW! There is no obligation—it'll take but a minute—and it may be your passport to a successful career in aviation. To save time, send it Air Mail.

Read What These R.A.I.-Trained Men Say:

R.A.I. Training Brings Better Job and Raise in Pay

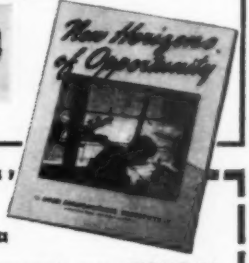
"At the time I enrolled for your training I was doing stock work at Bell Aircraft. However in October I got transferred into the Tool Design Department. My pay has been increased and I hope to realize more profits later." *Garwood Baybrook, Niagara Falls, N. Y.*

Says R.A.I. Course Superior to All

"I believe your course to be far superior to anything of this nature that has come to my attention. The personal attention which a student receives amazes me. I shall always recommend R.A.I. to anyone interested in Home Study Aeronautical Training." *A. DeLindholm, Los Angeles, California.*

Gets Job Before Graduating

"After a number of months of study, I called on one of the oldest aircraft manufacturers on the west coast, who in turn employed me as a draftsman. This shows how R.A.I. ranks with the aircraft industry. I would like to thank all at R.A.I. whose assistance has been of incalculable value to me." *William A. Houston, Jr., San Diego, California.*



Free! This Interesting 24-page Illustrated Book, Full Information and Costs

RYAN Aeronautical Institute
(Home Study Affiliate of Ryan School of Aeronautics)
135 Lindbergh Field, San Diego 1, California

Gentlemen:

Please send me, without any obligation on my part, your FREE 24-page illustrated book, "New Horizons of Opportunity," and full information on R.A.I., including cost of training, and job opportunities.

Name_____ **Age**_____

Street_____

City_____ **State**_____

ELECTRICITY

To Meet Aviation and Aircraft Industry Power Needs

ONAN ELECTRIC GENERATING PLANTS provide power for many applications in the aviation industry. Available in 65 models including Airborne, lightweight, compact types. Powered by Onan-built gasoline engines, they are of compact, single-unit design. For heavy duty service, stationary or mobile.

Models range from 350 to 35,000 watts. A.C. types from 115 to 660 volts; 50, 60, 180 cycles, single or three-phase; 400, 500 and 800 cycle, single phase; also special frequencies. D.C. types range from 6 to 4000 volts. Dual voltage types available. Write for engineering assistance or detailed literature.

Model shown is from OTC lightweight series.

ELECTRIC PLANTS Onan

D. W. ONAN & SONS
2190 Royalston Ave.
Minneapolis 5, Minn.

NEW — just published!

THE Aeronautical Dictionary

OVER 6000 ENTRIES, ILLUSTRATED

★ Over twice as many terms as any other book at its price.
★ All definitions in one alphabetical order.
★ All definitions in plain English, illustrated where necessary.
★ Contains 2000 terms never before explained in book form.
★ By *Thomas A. Dickinson*, author of the Aircraft Construction Handbook, and technical writer for Consolidated Vultee Aircraft Corp.
★ 484 pages; 268 drawings and photographs; handy 5¼" x 8¼" size; durable cloth binding.

$3.50, *at all booksellers, or postpaid from*
THOMAS Y. CROWELL CO., 432 4th Ave., N. Y. 16, N. Y.

Build These Realistic Cleveland Models

Mitchell B-25 Bomber
Span 55". C-D Master Flying Model Kit SF-329 ..... $8.50

Mustang P-51
Span 26 3/16". C-D MFM Kit SF-91 ..... $3.00

P-61 BLACK WIDOW. 36". C-D Kit T155, $1.50

Send 5c for Catalog

See your dealer first. If he can't supply you, order direct, including 20c extra for packing-postage.
CLEVELAND MODEL & SUPPLY CO.
4508E44 Lorain Ave. Cleveland 2, Ohio, U.S.A.

(*Continued from page* 140)

which means that it has a monopoly of subsidy—has been delayed but it will probably be out before this appears.

Little has leaked out about the government plans but the rumor has gone around in British aviation that the government intends to support British Overseas Airways even more strongly than before the criticisms against it were made, though shipping and railway interests are, it is added, to be brought in through the medium of a holding company.

It will remain—says the rumor—the "chosen instrument"—and will receive full government backing in all its negotiations. If this rumor proves to be true the government, and especially Lord Swinton, the Minister of Civil Aviation, will be in for further criticism.

Air Insurance

When he heard that Prof. G. T. R. Hill, Kennedy Professor of Engineering at University College, London, was to lecture on air travel in the future your correspondent decided to attend. He believed that readers of FLYING would want to know the views of one who has been in aviation as designer, aircraft builder, pilot and traveller for more than 30 years and who has just completed 70,000 miles flying, mainly on the American lines.

Professor Hill's views were so vigorously expressed that they caused a stir, especially among the London insurance interests. They may be summarized as follows: Britain is now hopelessly behind America in the service given to airline passengers; British airline fares are one and a half times the American for half the speed; British insurance rates are 10 times the American.

The point was made that the war has hit Britain harder and longer than the United States, but when Hill recounted the service he received on the American lines and contrasted it with what happened when he was travelling on a British line, the difference was seen to be marked. He approved the policy of consolidated payment with tips prohibited and with all services during the air passage free. He approved of air hostesses and said that they were more desirable (psychologically) than the tough men stewards on British Overseas Airways.

Hill is brother of Air Marshal Sir Roderic Hill, Air Officer Commanding-in-Chief, Fighter Command of the RAF. He was once interested in tailless aircraft and designed several of this kind. Some of these machines were used experimentally by the RAF but they were never ordered in quantity. Professorial in manner, Hill caused a laugh from his large audience when he held up a framed document, given him by the American Airlines, which commissioned him an "Admiral of the Flagship Fleet." He added that the privilege of using the Admiral's lounge at La Guardia was well worth having. END

I Learned About . . .

(*Continued from page* 76)

fident I could get the plane down without cracking it up. But first I motioned to the crew chief.

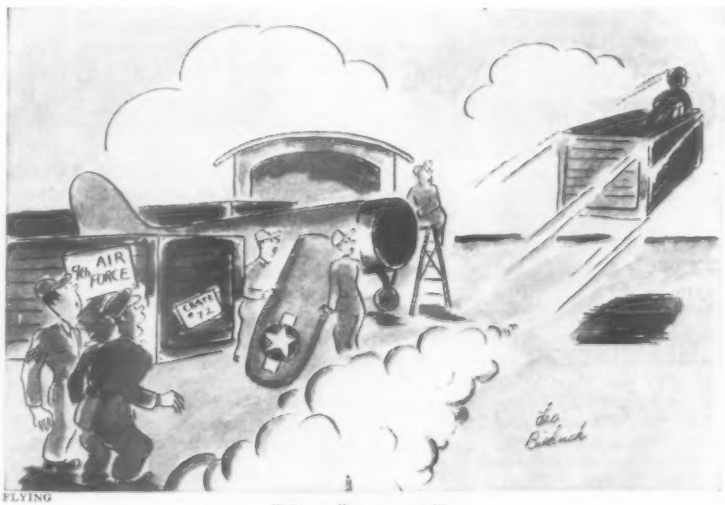
"Dick, go back to the tail and see if the control lock is still on or if something else is jamming the controls."

He nodded and disappeared to the rear. I made a slight adjustment of the throttles to compensate for his weight changing from nose to tail. He returned in a few moments, his face grave.

"I can't see if the elevator is locked on the outside," he said, "but I'm sure it's okay on the inside."

By this time we were approaching on our base leg and I eased back some more on the power to lose altitude. I made the final approach as long as the hills to the south would allow me. My problem was to establish a shallow power glide that would enable me to make contact with the nearest end of the runway—not too short, not too long.

The correct airspeed worked out to be



FLYING

"He really meant it!"

FOR YOUR AVIATION CAREER

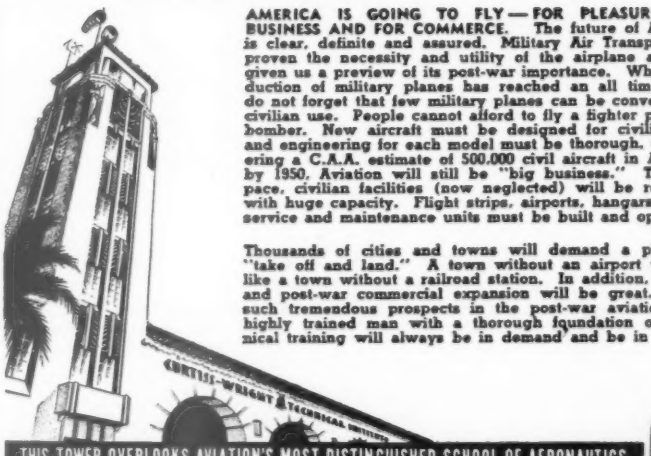
Train with

CAL-AERO
TECHNICAL INSTITUTE

MAJOR C. C. MOSELEY • PRES. SINCE 1929

FORMERLY CURTISS-WRIGHT TECHNICAL INSTITUTE

OFFERS THE BEST TO BE HAD IN SPECIALIZED TRAINING FOR AERONAUTICAL ENGINEERING AND MASTER AVIATION MECHANICS



THIS TOWER OVERLOOKS AVIATION'S MOST DISTINGUISHED SCHOOL OF AERONAUTICS

AMERICA IS GOING TO FLY — FOR PLEASURE, FOR BUSINESS AND FOR COMMERCE. The future of Aviation is clear, definite and assured. Military Air Transport has proven the necessity and utility of the airplane and has given us a preview of its post-war importance. While production of military planes has reached an all time high, do not forget that few military planes can be converted to civilian use. People cannot afford to fly a fighter plane or bomber. New aircraft must be designed for civilian use and engineering for each model must be thorough. Considering a C.A.A. estimate of 500,000 civil aircraft in America by 1950, Aviation will still be "big business." To keep pace, civilian facilities (now neglected) will be required with huge capacity. Flight strips, airports, hangars, sales, service and maintenance units must be built and operated.

Thousands of cities and towns will demand a place to "take off and land." A town without an airport will be like a town without a railroad station. In addition, Airline and post-war commercial expansion will be great. With such tremendous prospects in the post-war aviation, the highly trained man with a thorough foundation of technical training will always be in demand and be in line to fill positions of responsibility and trust, and earn more money.

Established in 1929, Cal-Aero Technical Institute is the logical school for you to obtain this foundation of technical training. Located in Southern California on its own giant airport*, it is in the heart of the aircraft industry. With up-to-the-minute training courses and modern equipment, it has the experience of graduating more than 6000 civilians for the aircraft industry and at the same time more than 20,000 pilots and 7,500 technicians for the Army Air Forces.

DISCHARGED VETERANS—Cal-Aero Technical Institute is on the Veterans' Administration list of approved schools for aeronautical training, as provided in the "G. I. Bill of Rights."

*Grand Central Airport (originally acquired by Curtiss-Wright Corporation in 1929 at a cost of almost $3,000,000), has been classified Class IV by C. A. A.—"Suitable for the largest aircraft in use or planned for the immediate future."

CAL-AERO TECHNICAL INSTITUTE

FORMERLY CURTISS-WRIGHT TECHNICAL INSTITUTE

GRAND CENTRAL AIR TERMINAL
1225 AIRWAY, GLENDALE 1, CALIFORNIA
(LOS ANGELES COUNTY)

UNDER PERSONAL SUPERVISION OF MAJOR C. C. MOSELEY, PRESIDENT AND FOUNDER, SINCE 1929

ON OUR OWN AIRPORT - IN THE HEART OF THE AIRCRAFT INDUSTRY

BE WISE—PROTECT YOUR FUTURE

MAIL TODAY • DON'T DELAY

WITHOUT COST OR OBLIGATION SEND ME FULL INFORMATION AND CATALOG ON THE COURSE CHECKED BELOW

- ☐ AERONAUTICAL ENGINEERING COURSE
- ☐ MASTER AVIATION MECHANIC COURSE
- ☐ SPECIALIZED ENGINE COURSE
- ☐ SPECIALIZED AIRPLANE COURSE
- ☐ POST GRADUATE AERONAUTICAL ENGINEERING COURSE
- ☐ SPECIALIZED AIRCRAFT SHEET METAL COURSE
- ☐ AERONAUTICAL DRAFTING COURSE, HOME STUDY
- ☐ AIRCRAFT BLUE PRINT READING COURSE, HOME STUDY

NAME _____

ADDRESS _____

CITY _____ STATE _____

DATE OF BIRTH _____ F-5

EVERY G.I. JOE SHOULD READ
this free book!

TELLS OF AVIATION'S CAREER OPPORTUNITIES AND ADVANTAGES OF TRAINING IN THE HEART OF THE NATION'S AVIATION CAPITAL

● Here is a book which tells you what you want to know about the opportunities in an aviation career. It points out the advantages of learning aviation at its source, in the very heart of the nation's aviation capital. It pictures Los Angeles Airport, campus of the veteran California Flyers School of Aeronautics, the very hub of the greatest aviation activity in the world.

● Aviation is changing so fast today that even war pilots with thousands of hours, and veteran aviation mechanics will need advanced training to keep up with its advancements and developments.

The modernly trained man of tomorrow will actually have a greater opportunity in aviation than the veterans who have not kept in step with aviation's rapid strides.

So, while we are now 100 per cent engaged in war work, we have discarded our old courses, and have answered all inquiries with "Sorry, no more enrollments till after the war."

For, as you know, *California Flyers* courses have always been not only *practical*, but *modern in every respect.*

Thus, when victory is an accomplished fact, you will find a *brand new California Flyers school of aeronautics*, brand new equipment and brand new courses — complete new courses for civilians and returning servicemen — supplementary courses for returning war pilots and aviation mechanics. We cannot release the details of what we have planned, but in all sincerity we say: *They Are Well Worth Waiting For!*

CALIFORNIA FLYERS, INC.

SCHOOL OF AERONAUTICS

LOS ANGELES AIRPORT • LOS ANGELES 43, CALIFORNIA

FREE BOOK OUTLINES AVIATION CAREERS

We've still a few of our 64-page illustrated catalogs. They're obsolete in some respects, but contain much information you'll enjoy about piloting, engineering, mechanics, etc. No obligation, no charge. The book is *free*. Send for it today.

TEAR OFF AND MAIL

California Flyers, Inc., Dept. F-5
Los Angeles Airport, Los Angeles 43, California

Gentlemen: Please send me your *free* catalog.

Name..... Age.....

Address.....

City..... Zone..... State.....

130 m.p.h.—which meant that was the speed we would touch the ground. The normal landing speed of the *Dragon* is about 65 m.p.h.

Between the plane and the runway were two rows of tall palm trees one-half mile apart. As we approached the first row, the nose dropped too much and we started to settle below the treetops. Hastily gunning the engines, I just managed to get the nose up again as we passed over the row of trees. I gulped hard to keep my heart down!

Lieutenant Galloway, my co-pilot, looked straight ahead and said in a hollow voice, "Major, we're getting too high again!"

I nodded and pulled back cautiously on the throttles, gradually lowering the nose until this time we skimmed over the second row of trees with a little more space to spare.

Ahead, now, lay the end of the runway. I checked the airspeed—still 130 m.p.h.

"I hope these tires will take it," I said, half aloud. Then I raised my voice. "Brace yourselves fellows. We're going to hit hard!"

Our glide angle brought us to a spot about 50 feet out in the dirt before the runway's edge. We hit the ground with a terrific bump and bounced twice, undamaged. It was a lucky thing, though, that we didn't hit the rigid concrete instead of the much softer earth. We undoubtedly would have blown our tires, with possibly more serious results.

We rolled to a stop—finally.

I turned to the crew chief:

"Dick, find out what was wrong."

He nodded and hurried out. In a minute, he was back, his face sheepish. "I found one block on the elevators, sir," he said, licking his lips. "I know now what happened. I put on the left block. Someone else must have put on the right later. So, I just took off the left one, never dreaming the right would be on."

His face a vivid red, he admitted he should have checked both sides, moving the control surface to see if it was free.

My mistake, too, was failure to check more thoroughly. I should have caught the oversight before take-off. But, I guess, that's the way we learn about flying. END

Letters

(*Continued from page 78*)

will make an effort to gobble up the surpluses. The Congress has made every effort to prevent this and will, I am sure, amend the Act, if necessary, to prevent the making of unconscionable profits out of our war surplus."

CARTER MANASCO (D.)
Washington, D. C. REP. 7TH DIST., ALA.

PRO-AIR FORCES

Sirs:

I believe a reply is necessary to Major Stewart's article, "Is Battle-Bombing Doomed?" appearing in FLYING's March issue.

The major is correct only in crediting the RAF heavies with a bigger bomb load and a lower loss rate, while conceding higher accuracy to the AAF heavies.

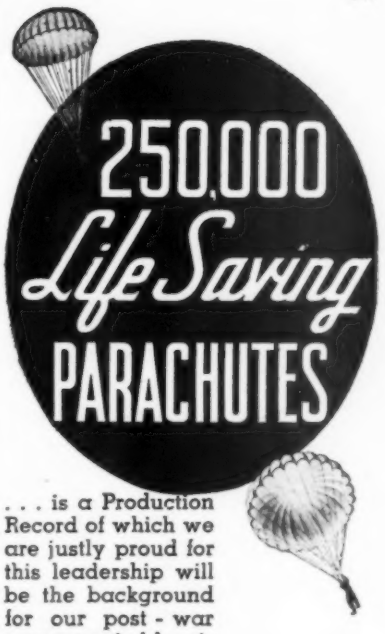
Intent upon destroying the *Luftwaffe's* planes as well as factories, the Britain-based AAF has flown daylight raids and has taken on the enemy fighters in the course of their attacks. Our heavies are escorted by numerous fighters and their presence was an additional challenge for the reluctant German air force to come up and fight.

Major Stewart's comment on the enemy's development of jet and rocket fighters should not overlook the development of such similar craft by the AAF. I, for one, do not believe that battle-bombing is doomed.

ROBERT MCKENNA
Rockford, Mich.

PHOTO CREDITS

4—HANS GROENHOFF
21-23—SOVFOTO.
24-27—AAF
28—HAL MORRIS
29—ARTHUR HAUG, THE AUTHOR
30-32—USN
33, 34—AAF
35—GUILLUMETTE
36—AAF, GUILLUMETTE
37—GUILLUMETTE, AAF
38—CHARLES H. HOLT, GUILLUMETTE
39-43—HAROLD W. KULICK
44—USN
46—HANS GROENHOFF
48—AAF
51—ART HUHTA
52, 53—CAA
54, 55—USN
56—THE SIGNAL (GERMANY)
57-59—NAVAL AVIATION NEWS
60—TAYLORCRAFT
61—AMERICAN AIRLINES
63—USN
65, 66—TWA
67, 68—REYNOLD BROWN
69—ERIK MILLER-LOCKHEED, ERIK MILLER-LOCKHEED, TWA
70—ERIK MILLER-LOCKHEED
71—AAF, PIPER, AAF, TOWNSEND GODSEY, CONSOLIDATED VULTEE
72—AAF, TAYLORCRAFT, CONSOLIDATED VULTEE, USMC, AAF, JOHNSON AIRCRAFT, ACME, LESLIE H. HOWARD, CALL
73—REPUBLIC, DOUGLAS, FRANK ROSS, AAF
74—NORTH AMERICAN, TWA, BRITISH INFORMATION SERVICES, BOEING, CURTISS-WRIGHT, NORTH AMERICAN, AAF, SOVFOTO
75—CHARLES E. BROWN
76—AAF
84—USN
88—UNITED AIR LINES
90—USMC
98—TWA
107—CAA
112—ART HUHTA
122—NATIONAL FILM BOARD
127—PAUL FOUNTAIN
130—ACME



. . . is a Production Record of which we are justly proud for this leadership will be the background for our post-war commercial business.

Our output today goes to meet war's demands. In like manner Switlik Safety Products tomorrow will play an important part in the peace-time pattern.

Wherever you fly —whenever you fly —wear a SAFE-T-CHUTE, for it is truly "the life line of the skies."

Educational air-safety film available for colleges—training schools—high schools.

ALSO write for the informative Switlik Parachute Chart and new manual. All free for the asking.

SWITLIK PARACHUTE COMPANY
Dept. F-5, TRENTON 7, NEW JERSEY

14,500 AOPA PILOTS CAN'T BE WRONG!

WITH headquarters in Washington, AOPA is on the spot to promote and protect the interests of its thousands of pilot members . . . to guard against restricting regulations; to keep its membership informed; to lead in the program to make private flying safer, more enjoyable, and less expensive. AOPA is America's No. 1 Club of the Air—a strong and vigorous non-profit organization devoted exclusively to the advancement of private flying. If you have soloed you are eligible for membership and are invited to join. Simply use the coupon; yearly membership dues are $5.00.

Many valuable services are FREE to members

The Washington staff of AOPA will help you in personal flying problems, licenses, regulations, legal tangles, plane sales and purchases, documents, employment. You are also entitled to national AOPA-Hertz Drive-Ur-Self courtesy card with special rates; AOPA Washington Newsletter; each month the special AOPA edition of FLYING Magazine; TWA-AOPA courtesy card assuring service and maintenance facilities at most TWA airports; distinctive AOPA pilot's wings, emblems for your plane and car, and membership card.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION
National Headquarters, Dept. F545
1003 K Street NW.
Washington, D. C.

I first soloed an airplane a.....in the year.....
I hereby apply for membership in AOPA.
Enclosed find check or money order for $5.00.

NAME.....
Please Print
ADDRESS.....
CITY & STATE.....
PILOT LICENSE NUMBER.....
SIGNATURE.....

"AOPA"
AIRCRAFT OWNERS AND PILOTS ASSOCIATION
NATIONAL HEADQUARTERS ✱ 1003 K STREET NW WASHINGTON 1, D. C.

The Right Start for a Great A & E MECHANICS Career

SPARTAN Specialized Training Will Put You Ahead of the Parade

You're a jump ahead on your way to success as an Aircraft and Engine Mechanic when you start with Spartan specialized training! Here is training that is so complete and practical that graduates can quickly build advancement to highly responsible positions.

The Spartan A&E Mechanic Course greatly surpasses the minimum requirements established by the government for Approved Mechanic Schools . . . in completeness of equipment, low student-instructor ratio, hours and subject material covered. Theory and shop practice are properly balanced to give maximum training results. Upon completion, the student is prepared not only to pass the C.A.A. examinations for the A&E Mechanic Certificate, but also to handle with confidence, skill and dispatch any task within his range of experience.

Yes, your Aircraft and Engine Mechanic training here at the "University of Aviation" puts you in step with today's needs and tomorrow's anticipated advancements.

Spartan provides the recognized type of professionalized training that gives you unequaled advantages—that permits you to be of great service to your country during the emergency of war, and to step into a splendid position in the great post-war aviation industry.

Unlimited Opportunities — America's busy aircraft industry urgently needs skilled licensed mechanics. Uncle Sam's famous air force needs A&E Mechanics, too. Spartan graduates have their choice of obtaining positions with airlines, repair stations, schools, factories, Army and Navy depots (Civil Service) and many other organizations.

Get the *right* start by training at Spartan now. Be ready to qualify for grades and rating when called to military service. Be ready to step into a life-time career in tomorrow's great aviation industry. Send coupon now for new catalog.

SPARTAN SCHOOL OF AERONAUTICS
DIVISION OF SPARTAN AIRCRAFT COMPANY
and COLLEGE OF AERONAUTICAL ENGINEERING
DIVISION OF SPARTAN SCHOOL OF AERONAUTICS

SPARTAN SCHOOL OF AERONAUTICS—Capt. Maxwell W. Balfour, Director
Address Dept. F55, Tulsa, Oklahoma
Send me your new Catalog, describing in detail the SPARTAN courses I have checked, also stating tuition and living expenses.

Name ..... Age .....
Address .....
City ..... State .....
Previous Education .....
Are You a Veteran? ..... In the Armed Forces? .....

CHECK COURSES YOU PREFER

- ☐ Aeronautical Engineering
- ☐ Airline Maintenance Engineering
- ☐ Commercial Pilot
- ☐ Commercial Flight Instructor
- ☐ Airline Service Mechanic (A&E)
- ☐ Instrument Technician
- ☐ Link Instructor
- ☐ Airline Pilot
- ☐ Fixed Base Operator-Pilot
- ☐ Aircraft or Engine Mechanic
- ☐ Airline Radio
- ☐ Private Pilot Course
- ☐ Weather Forecasting
- ☐ Women's Instrument Technician
- ☐ Parachute Rigger

Classified Advertising

RATE: 8c PER WORD — FIRST 15 WORDS $1.00

AIRPLANES FOR SALE

TWO Howard Low Wing trainers, 125 Warners, late series, fresh majors. Fresh license for year, new finishes. Ceilings well over $6000. Your choice only $1,950.00 each. Ed Bartholomew, Municipal Airport, Houston, Texas.

N-B LOW WING Monoplane, $150.00 complete; lightplane motors as low as $45 with propeller. Send 25c for new Spring War-Bargain catalogue just out listing hundreds of bargains in airplanes, motors, crackups, salvage, located everywhere, some probably near you. (35c by first class mail.) Used Aircraft Directory, Athens, Ohio.

AIRPLANES — USED — Bargains at give-a-way prices. Ready to fly. Don't buy that airplane or equipment until you have consulted our latest listing. You may save yourself a fortune. Send 20c to cover mailing. Aero-Trader, Adams 2, Mass.

AVIATION SUPPLIES

COMPLETE Aviation Supply Service. New and Used Parts, hardware, equipment and parachutes. Discounts up to 50%. Send for catalogue. Donnell Aviation Supply, Box 451, Dallas, Texas.

NEW TIRES: Factory Stocks—Our specials: 6.00x6 non-skid, 7.00x4, 8.00x4. Strictly first, 4-ply, $11.75. Tubes $3.25. All sizes stocked 6:50x10, 7:50x10, 8:50x10 Regular, 8.00-10.00 Smooth Contour Tailwheels, 6x2 Solid Tailwheels, $1.45. Lowest prices. Immediate deliveries. New reliable Merchandise. Sensenich Propellers. B. G. & Champion Spark Plugs. Storage Batteries. Shockcord Rings. Windshield Pyralin. Scott Tailwheel Assemblies. Bob Trader Aero Supply, Municipal Airport, Pittsburgh, Pa.

FLYING Caps, khaki twill, $1.25 each; dozen lots discount 25%. Plenty dopes, fabric, parts, supplies. Aero Parts Supply, Municipal Airport, Houston, Texas.

AVIATION EQUIPMENT

NAVIGAGE—A new device for cross country pilots. No calculations necessary—gives you instantly without a calculator, your time of arrival at each river, road, town or check point. Made in 3 speed ranges. When ordering, state approximate cruising speed of plane. Price $2.00 postpaid. Michigan School of Aviation, Detroit City Airport, Detroit 5, Mich.

LOOK—24-Hour Watch Dials fit any watch. 1 minute to apply. 15c each—2 for 25c. Send cash to Aviation Enterprises, Dept. 1, P. O. Box 671, Gallup, N. Mex.

AIR CORPS Squadron Insignias; for collectors and made to order. Prices and details, 10c. Hobbyguild, G-35 West 32nd St., New York.

AI-DEE III, a new low priced, pack type, Hand Aerial Camera. Write. Aero Devices, 5134 W. Madison St., Chicago 44, Ill.

INSTRUCTION

BUILD your own BG 6 Utility or BG 8 Two-place Sailplane from government certificated plans. Send 10 cents for illustrated circular. Briegleb Aircraft Company, Van Nuys, Calif.

PASS your CAA Examinations—Here is just what you may have been looking for: our multiple choice examinations. This is not another book, but a collection of genuine examinations used in CAA-CPT-WTS programs. Complete set, $1.00 postpaid. Supply limited. Aero-Trade Service, Adams, Mass.

GLIDERS

BLUE PRINTS AVAILABLE

• Utility Trainer • Primary Glider • Soaring Glider

SINGLE and TWO-PLACE

Write for **FREE** 3-View Pictures; Material List

California Aero Glider Co.

1829 West 62nd Street, Los Angeles 44, Calif.

PASS CAA Examinations. Multiple choice questions on Navigation, Meteorology, CAR, and General Service. Send only $1 for all four with answer key. Wisconsin Aeronautical Institute, 1522D Fleet Ave., Racine, Wis.

STUDENT Pilots—Prepare for the CAA written examination in your own home, under the supervision of a certificated instructor. Our thorough home study training eliminates the dry stuff in ground work. It will not cost you a fortune either. You need no longer deny yourself the benefit of competent ground instruction. We make it easy for you. Free particulars. Aeronautical Trade Institute, Dept. Bfg., Adams, Mass.

STUDENT Pilots—Prepare for the written examination for a Private Certificate with Miller's Study Guide. Consists of questions to be answered by using the proper CAA bulletin, multiple-choice tests similar to the CAA examinations, and correct answers to all questions. Guaranteed to be complete, accurate and up to date. Send $5.00 to J. G. Miller, P.O. Box 274, Albuquerque, New Mexico.

PATENTS

PATENT Particulars and Blanks Free: Sterling Buck, F, 637 North Ave., Baltimore 17, Md. Government-Registered Patent Attorney 37 years.

PATENT your Good Ideas! Send me your simple sketch or model. Free confidential advice—literature. Z. Polachek, Registered Patent Attorney-Engineer, 1234 Broadway, New York City.

PATENT Protection. Information and Invention Record Free. Randolph & Beavers, 372 Columbian Bldg., Washington, D. C.

PATENTS Secured. Two valuable booklets sent free. Write immediately. Victor J. Evans & Co., 948-E Merlin Bldg., Washington 6, D. C.

BOOKS

24 ISSUES only 50c. Hundreds airplane bargains, parts, news, etc. Aviation Advertiser, 8242 Travelair, Houston, Texas.

ATTENTION Student Pilots! "Questions for Pilots" by H. Greinke, CAA Certificated Flight & Ground Instructor. New multiple choice question and answer book to aid the student pilot in preparing for the CAA private pilot written examination. Contents include typical examination questions on Civil Air Regulations, Navigation, Meteorology and General Service of Aircraft. Easy to read, easy to handle. Order today! $1.00 postpaid or C.O.D. plus postage. Money back guarantee. Dept. F, 112 E. Grove St., Bloomington, Ill.

CIVILIAN Flying opening up! "Operating A Flying Club" tells how to start a good paying business without capital. How to expand; get business; where to buy Government surplus Airplanes for little cash. Valuable trade secrets! Author formerly with CAA. $1.00 brings your copy by return mail. Satisfaction guaranteed. Merritt Wells Pub. Co., Gladstone, N. J.

"100,000 POST - WAR JOBS ABROAD" — South America, Asia, Africa. How, When and Where to Apply. 15,000-word, copyrighted forecast—$1.00. Return for refund in 7 days if not satisfied. Pacific Industrial Research Bureau, 202-J Studio Building, Portland 5, Oregon.

"AIRCRAFT Hydraulic Systems," by E. W. McDonough. Design-Theory-Operation. A specialized branch of aeronautics for students, mechanics, engineers, draftsmen, training schools. Testing and maintenance of commercial and military hydraulic installations treated fully. $2.50. Aircraft Specialties, 134 So. Waller Ave., Chicago 44, Illinois.

CORRESPONDENCE Courses and self-instruction books, slightly used. Sold, rented, exchanged. All subjects. Satisfaction guaranteed. Cash paid for used courses. Complete information and 92-page illustrated bargain catalog FREE. Write—Nelson Company, Dept. 2-17, Chicago 4, Ill.

USED Aviation, Radio, Photography Books, Courses. Lists free. Shannon, 66B Elm Place, Nutley 10, N. J.

STUDENTS—of Aircraft and Engine Mechanics preparing for CAA licenses. A new book "Aero Mechanic's Questionnaire" is now available. 2,000 multiple-choice questions on: Sheet Metal, Welding, Hydraulics, Rigging, Aerodynamics, Wood Fabric, Dopeing; Propellers; Ignition; Lubrication; Carburetion; Power Plants; Civil Air Regulations. 200 questions on each of these ten subjects. Each question with five alternate answers. Answer keys included. $3.00 postpaid. C.O.D. slightly higher. Pazon Publications, 224 Maine, Lawrence, Kans.

QUALIFY as Airplane & Engine Mechanic, 1945 texts prepare you for A & E rating (license) exam. Covers all phases required mechanical work, diagrams and latest Civil Air Regulations. Author holds A & E Certificate plus Aeronautical Engineering Degree. Aircraft Text, $1.50. Engine Text, $1.50. Combination, $2.50. Postpaid or C.O.D. Flight Press, Box 101-A, Edwardsville, Illinois.

MAGAZINES (back dated)—foreign, domestic, arts. Books, booklets, subscriptions, pin-ups, etc. Catalog 10c (refunded). Cicerone's, 863 First Ave., New York 17, N. Y.

MISCELLANEOUS

WANTED—Motorscooters, Motorcycles, small gasoline motors, transmissions, parts, small airplane motors, etc. Name your own price. Write: Midget Motors Directory, Athens, Ohio.

SCIENTISTS astounded! Black-white movie films, slides, projected in natural colors. Iriscope kit, complete instructions, $5.00, postpaid. Experimental use only. Supply limited. Details stamp. Jenkins, Box 392-N, Elmira, N. Y.

BEAUTIFUL airline baggage stickers, new hobby, 7 different 25c, 20—$1.00; 32—$2.00. E. K. Smith, Dept. FL, 1234 N. State, Chicago 5, Ill.

MIDGET Car, $20, less motor; Servicycle, $25, less motor; motor-scooter (new tires), $25, less motor. Briggs-Stratton, Lauson, Maytag motors, some as low as $3; unrationed 10, 12, 14-inch balloon tires, $1.75 to $6.50. Mail order only. Send 25c for Big War-Bargain Catalogue No. 7, just out, containing hundreds of bargains in Motorbikes, Motorscooters, Motorcycles, Midget Cars, tires, parts, plans, etc. (35c by first class mail.) Midget Motors Directory, Athens, Ohio.

HAVING Car Trouble? Used, guaranteed auto, truck parts. Save money. Transmission specialists. Describe needs; immediate reply. Victory, 2439L Gunnison, Chicago 25.

PHOTOGRAPHS: Latest action photos of your favorite U.S. Military planes. These are real professional HI-GLOSS photographs. Start your collection now. Free list of latest planes with order. Send 15c to cover costs of handling and mailing for one or send $1.00 for 10 different photographs. Star Photos, 1507 Kenneth Rd., Glendale 1, Calif.

EVERY Picture An Enlargement. 8 sparkling deckle-edge Enlargements and roll developed 25c coin; 116 size or smaller; enlarge reprints 3c. Enlarge Photo, Box 791N, Boston, Mass.

ENGINEERS. Register as Consultants. Join United Engineers nation-wide industrial service organization. Guild membership provides business services for engineers. Write Box 1065-B, Los Angeles 28, Calif.

SITUATIONS WANTED

COMMERCIAL Pilot now employed desires connection with reliable Latin American project. Eight thousand hours, twelve years' experience. Speak Spanish and Portuguese. All ratings. Sales experience. Write Box 254, % Flying.

POSITION Wanted: Airline Transport Pilot, Flight Instructor, Executive; 0-3150 H. P., single and multi-engine, 7400 hours certified flying time. Specialist in precision training and checking of pilots of all classifications. Draft exempt. Write Box 255, % Flying.

JUNIOR Engineer desires position in Spanish speaking country with North American company. 3½ years aircraft engine manufacturing and testing, 5 years insurance underwriting, 2 years college, moderate Spanish fluency. Private Pilot's license, 275 hours. Single; Age 25. Box 256, % Flying.

FORMER U. S. Army Basic Flight instructor desires position flying full time or ground work with some flying. Over 3,000 hours. Box 257, % Flying.

A and E MECHANIC, 5 years' experience, single, 33, draft exempt. Box 105, Burlingame, Calif.

RETIRED AAF pilot. Perfect health. Commercial license 120-7200 horsepower. Limited instrument rating. 3½ years university, 26 years old. Available immediately. Box 251, % Flying.

WANTED—MISCELLANEOUS

WATCHES Wanted—Broken or usable—all kinds, even Ingersolls. Highest prices paid for jewelry, rings, spectacles, alarm clocks, razors, cigarette lighters, gold teeth, etc. Cash mailed promptly. Lowe's, Holland Building, St. Louis 1, Mo.

INDEX OF Advertisers MAY 1945

COMPANY	AGENCY	PAGE No.
Aeronautical Products, Inc	Howard D. Steere Advertising	126
Aeronautical University	N. W. Ayer & Son, Inc	130
Aeronca Aircraft Corporation	The Ralph H. Jones Company	77
Aircooled Motors Corp	Spitz and Webb Advertising	18
Aircraft Owners and Pilots Ass'n		148
AiResearch Manufacturing Co	J. Walter Thompson Company	125
American Optical Company, Inc	J. M. Mathes, Inc	131
American School of Aircraft Instruments	West-Marquis, Inc	141
Aviation Associates	Van Hecker, Inc	130
Beech Aircraft Corporation	The McCormick-Armstrong Co	20
Bell Aircraft Corporation	Addison Vars Company, Adv	91
Bellanca Aircraft Corporation	Roberts and Riemers, Inc	14
Bendix Aviation Corp.-Bendix Radio Division	MacManus, John & Adams, Inc	123
Boeing Airplane Company	N. W. Ayer & Son, Inc	85
Bogue, Benjamin N	N. W. Ayer & Son, Inc	134
Breeze Corporations, Inc	Burke Dowling Adams & Co	87
Cal-Aero Technical Institute	Oscar Nordin Co., Advertising	145
California Aero Glider Company	Ad-Age Advertising Company	150
California Flyers, Inc	John H. Riordan Co. Adv	146
Canadian Institute of Science & Technology, Limited	Ferres Advertising Service	122
Cessna Aircraft Company	Gardner Advertising Company	16
Champion Spark Plug Company	MacManus, John & Adams, Inc.	79
Chandler-Evans Corporation	Wm. B. Remington Inc	101
Cleveland Model & Supply Co	The Carpenter Advertising Co	144
Comptone Company	Byrde Richard & Pound	138
Continental Motors Corporation	Wallace-Lindeman, Inc	121
Crowell, Thomas Y., Co	Franklin Spier, Inc	144
Culver Aircraft Corporation	The McCormick-Armstrong Co	152
Curtiss-Wright Corp.—Airplane Div	Landsheft, Inc	104
Curtiss-Wright Corp.—Propeller Div	Burke Dowling Adams & Co	50
Doak Aircraft Company, Inc	The Essig Company, Ltd	135
Douglas Aircraft Company	The Essig Company, Ltd	93
Douglas, W. L., Shoe Co	Harold Cabot & Co., Inc	119
Edo Aircraft Corporation	Cowan & Dengler, Inc	5
Electronic Specialty Company	West-Marquis, Inc	116
Engineering and Research Corp	Dorland International-Pettingell & Fenton, Inc	118
Firestone Aircraft Company	Sweeney & James Co., Adv	10, 11
Flightex Fabrics, Inc	Powerad Co	99
Funk Aircraft Co	Brooks-Wilson Advertising	124
General Tire & Rubber Co., The	D'Arcy Advertising Company	19
Globe Aircraft Corporation	Evans & LeMay Advertising Agency	Third Cover
Goodrich, B. F., Company, The	Batten, Barton, Durstine & Osborn Inc	3
Grumman Aircraft Engineering Corp	Charles W. Hoyt Company, Inc.	103
Hallicrafters Company, The	Burton Browne Advertising	113
Harley-Davidson Motor Co	Klau-Van Pietersom-Dunlap Associates Inc	140

COMPANY	AGENCY	PAGE No.
Helicopter Guildsman, The	C. C. Fogarty Company	134
Henry Leonard & Thomas, Inc	William G. Seidenbaum Advertising Agency	114
Hughes Aircraft Company	Gano, Wilhelm, Laughlin Adv	45
Jack & Heintz Incorporated	The Griswold-Eshleman Co	94, 95
Kinner Motors, Inc	West-Marquis, Inc	15
Kollsman Aircraft Instruments	Erwin, Wasey & Company, Inc	9
Koppers Company, Inc	Van Sant, Dugdale & Co. Inc	17
Lear, Incorporated	Arthur Kudner, Inc	111
Lewis School of Aeronautics	Frank C. Nasher, Inc	139
Link Aviation Devices, Inc	Craven & Hedrick Advertising	102
Lockheed Aircraft Corporation	Foote, Cone & Belding	Back Cover
Luscombe Airplane Corporation	Kelly Nason Incorporated	49
Mall Tool Company	Charles Elwyn Hayes Adv	108
Martin, Glenn L., Co., The	Van Sant, Dugdale & Co. Inc	81
Marxman Pipes, Inc	E. H. Brown Advertising Agy	134
Nelson Co	A. N. Baker Adv. Agy., Inc	112
Northrop Aircraft, Inc	J. Walter Thompson Company	47
Oldsmobile Div. of General Motors	D. P. Brother & Co., Inc	109
Onan, D. W., & Sons	Graves & Associates	144
Paris, Roy	James W. Huff, Advertising	138
Perry Sales Co	The S. A. Levyne Company	140
Piper Aircraft Corporation	Hutchins Advtising Co. Inc	12
Plomb Tool Company	Willard G. Gregory & Co	100
Ranger Aircraft Engines	Cecil & Presbrey, Inc	89
Romec Pump Company	The White Advertising Co	129
Roosevelt Aviation School	N. W. Ayer & Son, Inc	128
Rotol Limited		13
Ryan Aeronautical Company	Barton A. Stebbins Adv. Agy	115
Ryan Aeronautical Institute	Barton A. Stebbins Adv. Agy	143
Schofield's Flying Equipment		132
Sherrill Research Corp	Western Advertising Agency	120
Skylark Manufacturing Co., Inc	Brisacher, Van Norden & Staff, Inc	105
Snap-On Tools Corporation	Scott-Telander Advertising Agy	133
Spartan Aircraft Co.—Spartan Aero Repair Division	The Potts-Turnbull Company	97
Spartan School of Aeronautics	The Potts-Turnbull Company	149
Sperry Gyroscope Company, Inc	Young & Rubicam, Inc	83
Standard of California	Batten, Barton, Durstine & Osborn Inc	8
Stanzel, Victor, & Co		132
Stern, L & H, Inc	Al Paul Lefton Company Inc	137
Stinson Division—Consolidated Vultee Aircraft Corporation	Young & Rubicam, Inc	6, 7
Studebaker Corporation, The	Roche, Williams & Cleary, Inc	117
Switlik Parachute Company	Broomfield-Podmore Adv	147
Union Oil Company	Foote, Cone & Belding	106
Wright Aeronautical Corporation	Burke Dowling Adams & Co	Second Cover

Industrial Aviation ... FIRST ON THE READING LIST OF AVIATION EXECUTIVES, ENGINEERS AND PURCHASING AGENTS

There's no mystery about it . . . INDUSTRIAL AVIATION is written for design, production, management, and purchasing executives of aircraft, aircraft parts, and engine manufacturers . . . and circulation is limited to this group. INDUSTRIAL AVIATION speaks their language.

Subscription rates: 1 year . . $2; 2 years . . $3.50; 3 years . . $5
When placing subscription please give name of company and title

INDUSTRIAL AVIATION
540 N. Michigan Ave., Chicago 11, Ill.

worth waiting for NEWS

No. 4 TRIBUTE

THE FOURTH OF A SERIES OF INFORMATIVE ADVERTISEMENTS ABOUT THE NEW CULVER.
PUBLISHED BY THE CULVER AIRCRAFT CORPORATION, WICHITA 1, KANSAS

TO A DEAR DEPARTED FRIEND

DURING the War period we have received thousands of letters testifying to the advanced aerodynamic design and new light-plane features of the original Culver. Many have expressed the hope that we will bring out the same ship, with slight modifications, after the war. For these thoughts and sentiments we are truly grateful. But, as manufacturers of airplanes, we feel our obligation to the hearty, rugged old pilots – to those who have made flying a part of their lives through Army and Navy training, as well as those millions who will want to learn to fly postwar – transcends a reword job on an old design.

So, we pay a tribute to "a dear departed friend" who was well received and who did much to introduce outstanding performance at low cost to the flying public. However, we feel that we would have failed indeed, if we did not give the flying public the benefit of design experience gained during the war in the New Culver which will be introduced when America is again flying on the wings of peace.

Why? you ask. Because we believe flying must be simplified if it is to be universally accepted and enjoyed. It must be safe. The "hot" element must be removed. The chance for pilot error must be taken out of the cockpit.

How many automobiles would have been sold today if it had taken a race-track daredevil to drive them? The automotive industry has so simplified driving that a child, long before he becomes of legal driving age, can generally sit behind the wheel and do an expert job of safe driving.

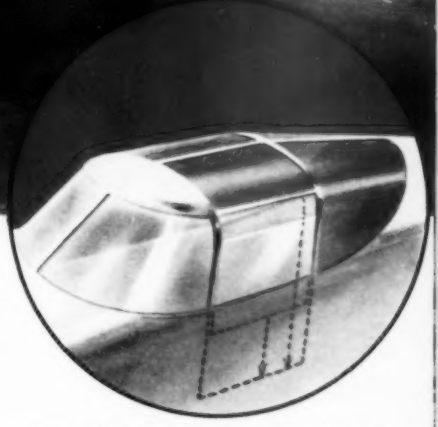
We do not mean that the New Culver will fly itself. Nor do we think there shouldn't be airplanes especially designed for the stunt pilot. But, we do mean that the New Culver will incorporate all of the safety factors we have learned through concentrated designing in the war period by way of anti-stall characteristics, thus eliminating spins; plus the incorporation of many new ideas for ease of learning to fly, which means safe flying, with the plane doing much of the thinking; plus excellent vision, tricycle retractable gear that gives greater safety and ease of operation in landing, take-off and ground handling.

Our engineering department is dedicated to designing, and the plant to building, *an airplane with a purpose*. High performance, safety, ease of operation, simplified control, will make the New Culver an airplane to be universally enjoyed by the novice, the experienced pilot, and by the layman who has yet to receive his first thrill of streaking through the sky on wings.

So, if your thinking matches ours, join with us in paying tribute to "a dear departed friend" who was good in his day. And join with us in anticipating our departed friend's offspring: The New Culver, a low-wing, plastic bonded wood constructed, monoplane with tricycle retractable gear that will be safe, easy to fly, with Culver *built-in performance* and economy of operation. That new "baby" is definitely worth waiting for!

FOR THE LATEST INFORMATION WRITE CULVER AIRCRAFT CORP., DEPT. FD, WICHITA 1, KANSAS

PRINTED IN U.S.A.



Arrows indicate how both top and side panels slide down into fuselage wall. A lock on top where panels meet secures the entire cabin.

Control Tower Vision gives new flying safety and pleasure in the *Swift*

Wide, clear vision is ***one*** reason why you'll enjoy flying the new ***Swift.***
The ***Swift's*** dynamically styled canopy provides easy access to the roomy cabin from either side through sliding panels that disappear into the fuselage walls. You just step in and sit down . . . no stooping, crouching, or effort required . . . no door to catch the slipstream.

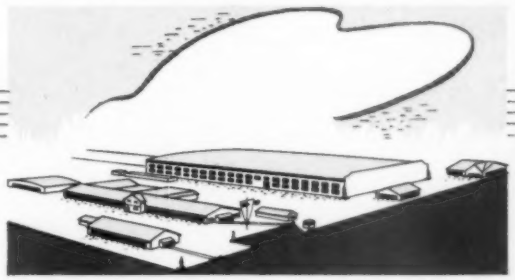
The double-track panels give you any degree of airiness you want . . . top with sides open . . . sides with top open . . . open either side . . . completely open or closed . . . from an open cockpit to a closed cabin as quick and easy as closing an auto window.

Top panels are tinted to provide sun protection.

Yes, the new ***Swift*** is the kind of plane you've dreamed of owning, and its reasonable cost and thrifty operation will make owning and flying your own plane surprisingly easy. The new ***Swift*** will be ready soon after conditions permit the manufacture of personal airplanes.

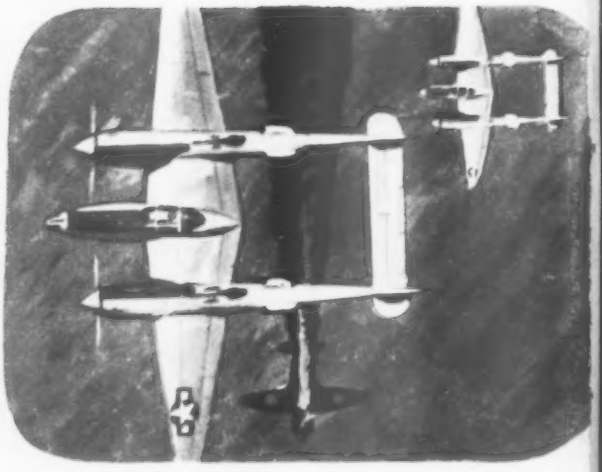
The Swift

Made by GLOBE AIRCRAFT CORPORATION Fort Worth, Texas



Der Gabelschwanz Teufel

Der Gabelschwanz Teufel, "fork-tailed devil." Named by German pilots who have been lucky enough to escape its wrath. Americans know it as the Lockheed P-38 Lightning – one of the most efficient fighters the world has ever known.



Japs know it, too. In the Pacific, it is probable that more enemy aircraft have been destroyed by the Lockheed Lightning than by any other American fighter. The 49th group alone has a record of more than 537 planes downed in combat.

One of the most versatile of warplanes, Lightnings range far to protect heavy bombers – to photograph military positions. They can blast the enemy with machine guns and cannon, launch rockets, drop bombs or torpedoes, strafe and knock down attackers.

Lockheed builds other great planes for war. The B-17, the Navy PV, a new Army fighter and the majestic Constellation. Each contributes to victory, and each is contributing to the peace when Lockheed will again build planes for commerce and for you.

LOOK TO *Lockheed* FOR LEADERSHIP

Lockheed Aircraft Corporation, Burbank, California

LOCKHEED